TP 3941 E

COMMUNICATION AIDS FOR TRAVELLERS WITH SIGHT/ HEARING/SPEECH DISABILITIES

FINAL REPORT

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The contents of this report reflect the views of the contractor and not necessarily the official views or policies of the Transportation Development Centre.

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17. Abstract

This study reviews the communication needs of travellers with sight, hearing or speech disabilities during the different stages of inter-city trips made on public carriers. The major elements of the report are as follows:

- estimation of the Canadian population of communication-impaired travellers;
- identification of the needs of these travellers;
- identification and evaluation of technological aids available to meet these needs;
- review of government and industry practices and policies in this area;
- development of guidelines addressing the needs of communication-impaired travellers;
- development of a proposed improvement program based on the above guidelines.

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17. Résumé

Cette étude a passé en revue les besoins ressentis par les passagers souffrant d'une déficience visuelle ou auditive, ou d'un defaut d'élocution, durant les diverses etapes des déplacements intervilles qu'ils effectuent à bord de véhicules de transport en commun. Les principaux éléments de cette étude ont été les suivants:

- estimation du nombre de voyageurs canadiens souffrant d'une forme quelconque de handicap;
- recherche des besoins ressentis par cette catégorie de voyageurs;
- recherche et évaluation des diverses aides susceptibles de répondre à ces besoins;
- revue des méthodes et des politiques gouvernementales applicables à ce domaine;
- elaboration de lignes directrices applicables;
- elaboration d'un programme d'aide amélioré inspire de ces lignes directrices.

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SUMMARY

A number of studies are being undertaken by various public agencies and organizations with the objective of improving the access to the national transportation system for the Canadian population with special needs. A person with special needs is an individual with a disability whose needs are best met in a manner different from most people. Among these projects there is no comprehensive study covering all phases of a journey and on all inter-city public carriers for travellers with sight/hearing/speech disabilities. Therefore, the Transportation Development Centre of Transport Canada considered it appropriate to sponsor this present study with the objective of identifying and assessing the communication/information needs of travellers with sight, hearing and speech impairments on board public transport vehicles and at terminals, and making appropriate recommendations.

THE NEEDS OF TRAVELLERS WITH COMMUNICATION DISABILITIES

There is an absence of basic data relating to the number of communication-impaired people in Canada and their demographic and socio-economic characteristics. Furthermore, the crude estimates which are available are not always consistent and do not provide a clear breakdown of the population by degree of impairment. As a result of the lack of basic data, most estimates of the communication-impaired population in Canada are based on prevalence rates developed through surveys carried out in the United States.

Estimates were made of the potential travel demand of communication-impaired persons in Canada based on the travel characteristics of the general population modified to some extent to account for the different age distribution and employment situation of communication-impaired persons relative to the general population. The estimates represent the potential travel demand by communication-impaired persons and not the actual existing travel demand of this group. There is no data on the existing travel patterns of communication-impaired persons, but it is likely that they are lower than the potential values since existing communications barriers would reduce the propensity for travel by this group.

As with all inter-city travellers, communication-impaired persons have information and communication needs throughout the various stages of a trip. Similarly, for all travellers, information must be provided and communications carried out in a format compatible with the abilities of the traveller. The general population typically has the option of receiving information in visual or audio form and of communicating either orally or in writing. The communication-impaired population has a more restricted set of options for receiving and communicating information. Persons with multiple disabilities have even greater restrictions on the format of their communications.

The needs of travellers with sight, hearing or speech disabilities are similar to the needs of any traveller. What is important is the way in which the needs are met both in terms of human assistance and technological aids. Personnel dealing with communication-impaired travellers should be aware of the abilities of these people and respond to those abilities. Similarly, aids such as signage, broadcast systems and other devices should be designed with the abilities of communication-impaired travellers in mind.

TECHNOLOGICAL AIDS

Aids for Sight Impaired Travellers

Technological aids which can be used to meet the information and communication needs of blind and partially sighted travellers can be grouped into the following three categories: broadcast systems; audio information systems; and tactile systems.

Typically, broadcast systems transfer audio information directly from the information source to the listener utilizing a transmission other than sound waves. The method, therefore, requires the use of specialized transmitters and receivers. The advantages of using a broadcast system rather than simply using a public address amplifier and speaker include selectivity of audience and isolation from ambient noise.

Audio information systems attempt to present in audio form the visual information that is typically available to travellers. This category includes audio guidance systems which provide navigation and orientation configurations for blind and partially sighted travellers. An example of this type of system is an automatic elevator floor announcer. These devices, which make use of digital speech synthesizer products, announce which floor the elevator is stopping at and the direction in which the elevator is going, and warns when the doors are about to close.

Tactile information systems provide additional orientation and navigation for blind and sight impaired travellers. Included under this category are such devices as tactile warning strips which are placed along walkways when there is change in grade and at platform edges, and small tactile maps which could provide a basic model of transportation terminals. Another device which can be used to provide tactile information is a tactile printer which can print Braille characters and graphic information in relief.

Aids for Hearing Impaired Travellers

There are a variety of aids available to meet some of the information and communication needs of deaf and hard of hearing travellers. These aids include: signage systems; teletext systems; hearing aids; and non-technological aids.

Signs and other visual displays can be very efficient replacements of public address announcements for hard of hearing and deaf travellers if properly designed and installed. In addition to duplicating audio announcements, the signs can show additional detailed information not easily remembered from audio announcements.

Teletext systems include a class of communication devices commonly referred to as "Telephone Devices for the Deaf" or "Teledevices for the Deaf" (TDD) which allow deaf persons to communicate using telephone lines. The transmitter of such devices consists of a keyboard on which messages are typed. The message is then transmitted over the telephone line and appears on a printer or a small alphanumeric display on the receiving TDD.

Hearing Aids

Hearing aids normally pick up sounds from a small built-in microphone and amplify these sounds at the user's ear. Because the microphone does not pick up the sound from a telephone earpiece very well, many hearing aids also have a switch (the T-switch) which enables the hearing aid to receive input from a built-in induction loop. The induction loop can sense the magnetic field produced by the telephone ear piece so long as the ear piece uses electromagnetic as opposed to electrostatic technology. Most telephone companies offer a small portable coupler which will convert the acoustic energy which an ear piece produces into magnetic energy which hearing aides can use as input. Unfortunately, portable couplers are not compatible across Canada, because of differences in ear-piece design.

Non-technological aids include aids such as sign language and paper and pencil.

Aids for the Speech Impaired

Many of the aids previously described for sight and hearing impaired persons would also be beneficial for speech impaired travellers. These aids include broadcast systems, automated telephone information, signage, TDDs, sign language and paper and pencil.

Artifical voices are aids which are specifically appropriate for use by some speech impaired travellers. This category of aids includes such devices as the artificial larynx which duplicates the function of the human larynx, i.e. producing the source sound from which speech is is formed. Another technology is digitized electronic speech which makes it possible to generate speech directly from a keyboard input through the use of an acoustic speaker.

INDUSTRY AND GOVERNMENT PRACTICES AND POLICIES

Industry Practices and Policies

Virtually all airlines have a formalized training program for ground and cabin personnel which is aimed at developing an understanding of the special needs of disabled travellers. Via Rail has also implemented such a program as have a number of bus companies. The majority of bus companies have not adopted this practice as of yet. However, bus drivers provide assistance to communication-impaired travellers on an informal basis.

All carriers have a policy to provide some degree of personal assistance both within the terminals from which they operate and on-board

EXHIBIT 1

PROPOSED IMPROVEMENT PROGRAM

TRIP STAGE	IMPROVEMENT MEASURE	IMPAIRMENT GROUPS ASSISTED	IMPLEMENTATION APPROACH	TIMING	COST
All stages	1. All personnel of inter-city carriers who deal with communication-impaired travellers should receive training to improve their awareness of the needs of these travellers and how the needs can be met.	All communication-impaired travellers.	The major air carriers, VIA Rail and several inter-city bus companies have training programs which instruct their personnel in how to meet the needs of disabled travellers. This measure would entail extending such training programs to all other inter-city carriers.	Developed and administered over a two year time period.	Development costs depend upon the nature of the program and could range up to $80,000. However, existing training programs could be purchased for less than $1000. Allocation Carriers
Trip Planning	2. An information guide in Braille, large print and/or audio cassette form.	Blind, partially sighted impaired and other persons with disabilities which limit reading.	Transport Canada could prepare an information guide for blind and sight impaired persons similar to their recent publication "A Guide for Travellers with Special Needs." The guide would inform blind and partially sighted travellers of the special transportation services offered by carriers across Canada.	Implementation over a one to two year time frame.	Development: $25,000 to $40,000. Implementation: $5 to $10 per Braille brochure or cassette. Allocation: Transport Canada
	3. All major carriers should be accessible via TDD.	Deaf, profoundly speech impaired and other persons who use TDD's.	Air Canada and Via Rail provide information and reservations via a TDD. This measure would involve extending these services to other major inter-city air and bus passenger carriers. Since communications via TDD can be time consuming, these devices should be accessible via toll free numbers.	Implementation in less than one year.	Capital costs per carrier: $500. Operating costs: $3,000 to $30,000 per year depending upon long distance charges. Allocation: Carriers

vehicles. All modes have in their tariffs, sections which allow dog guides to travel with their masters at no extra fare. VIA Rail and the major bus companies also allow disabled passengers to travel with another person who acts as an attendant for the price of one fare.

Federal Government Policies

The primary sources of current and proposed Federal policies with respect to the information/communication needs of communication-impaired travellers are Transport Canada and the Canadian Transport Commission (CTC). Other agencies who either have existing policies in the area or who are in the process of policy review and development include: Public Works Canada, the Department of Communications and the Canadian Radio Television and Telecommunications Commission (CRTC).

Transport Canada and the Minister's Advisory Committee on Transportation of the Handicapped (ACTH) has developed a draft "Federal Policy on Transportation of Disabled Persons." This policy is in response to the recommendations contained in the report "Obstacles" prepared by the Special Parliamentary Committee on the Disabled and Handicapped. Simply stated, the proposed policy is to ensure that reasonable and equitable access is provided to disabled persons on transportation modes under Federal jurisdiction, and to remove the physical and attitudinal barriers to travel which these persons experience.

Recommended Guidelines

The proposed "Federal Policy on Transportation of Disabled Persons" which has been developed by Transport Canada addresses at a broad level the communication and information needs of sight, hearing and speech impaired travellers. A suggested set of specific guidelines which address the needs of communications impaired persons during the different stages of travel has been developed based on the principles underlying the proposed Federal policies. These guidelines could be adopted by Transport Canada and/or acted upon by the CTC and provincial transport boards during the review of operating licenses of inter-city passenger carriers.

PROPOSED IMPROVEMENT PROGRAM

The proposed improvement program consists of ten measures as shown in Exhibit 1. The first measure, the training of all carrier personnel who deal with communication-impaired travellers, addresses the needs of these travellers during all stages of an inter-city trip. The remaining nine measures address specific needs which arise during one of the four stages of a trip.

Exhibit 1 defines each of the measures, indicates which impairment groups would be assisted by the measure, outlines an implementation approach and discusses the timing and possible cost of the measures.

Priority of Implementation

Although all of the measures included in the improvement program would assist communication-impaired travellers, the implementation of each

EXHIBIT 1
(Continued)

PROPOSED IMPROVEMENT PROGRAM

TRIP STAGE	IMPROVEMENT MEASURE	IMPAIRMENT GROUPS ASSISTED	IMPLEMENTATION APPROACH	TIMING	COST
Access to and from Terminals Planning	4. Assistance in making arrangements with transportation services which access inter-city terminals should be available to communication-impaired travellers.	All communication-impaired travellers.	Air carriers, VIA Rail and bus operators generally provide travellers with information and assistance through their ticketing agents. In addition, Transport Canada has information booths in some of Canada's major international airports. This measure would involve ensuring that information on all transportation services which access the terminal, including information on any special services for disabled travellers is available from these sources.	Implementation possible within a year.	Minimal in small cities, up to a few thousand dollars in large cities. Allocation: Carriers and terminal operators
	5. The awareness of the needs of communication-impaired travellers by intra-city transportation operators should be improved.	All communication-impaired travellers.	When intra-city transportation services are provided to a terminal on a contract basis, the terminal operator or carrier responsible for the contract should include as a provision a requirement that the operator of the intra-city service will undertake to improve the level of awareness of his employees of the needs of the disabled travellers.	Gradual implementation as contracts are renewed.	Several hundred dollars per operator for training materials and brochures. Allocation: Intra-city transportation operators
Terminals	6. Tickets should be coded to identify the special needs of communication-impaired travellers.	All communication-impaired travellers.	In order to assist carrier personnel in meeting the needs of communications impaired travellers, tickets could be coded to identify these needs either when the reservation is made or when the ticket or boarding pass is issued.	Currently being implemented by VIA Rail and Air Canada. Other carriers could implement manual systems within a few months.	Minimal for manual system; on a computerized system, this measure would be done in combination with other changes. Allocation: Carriers

EXHIBIT 1
(Continued)

PROPOSED IMPROVEMENT PROGRAM

TRIP STAGE	IMPROVEMENT MEASURE	IMPAIRMENT GROUPS ASSISTED	IMPLEMENTATION APPROACH	TIMING	COST
Terminals	7. Improved orientation information.	Blind and partially sighted impaired travellers, as well as other travellers to some extent.	This measure would consist of a number of elements including improved signage, cueing and, in a limited number of applications, broadcast systems. Signage standards should take into account the abilities of sight impaired travellers; cueing standards should be developed and applied to new construction; and there should be a demonstration of 'Talking Signs' technology to determine its effectiveness in providing orientation information.	Signage improvements and cueing over a five year time period; 'Talking Signs' demonstration in two year time frame.	Development of signage standards: $20,000 - $30,000, improved signage and cueing: $500 to $10,000+ per terminal; 'Talking Signs': $10,000 - $40,000 per terminal. Allocation: Terminal operator and Transport Canada
	8. Audio and visual arrival and departure announcements.	All communication-impaired travellers.	The intent of this measure would be to ensure that all important information on arrivals and departures is available in both audio and visual form. This measure would be relatively straightforward to implement in smaller terminals where the number of arrivals and departures is limited. In larger terminals, it would be difficult and confusing to announce all arrivals and departures over a public address system. In these cases, information should be available via direct line telephones placed at key locations within the terminal.	Development of standards within two years; implementation would be ongoing.	Development of announcement standards: $20,000 - $30,000; implementation costs would be highly variable ranging from a few hundred to $50,000+. Allocation: Transport Canada and terminal operators

EXHIBIT 1
(Continued)

PROPOSED IMPROVEMENT PROGRAM

TRIP STAGE	IMPROVEMENT MEASURE	IMPAIRMENT GROUPS ASSISTED	IMPLEMENTATION APPROACH	TIMING	COST
Terminals	9. The level of awareness of non-carrier personnel dealing with the public in terminals should be improved.	All communication-impaired travellers.	Measure No. 1 recommends extending awareness training programs to all carrier personnel who deal with communication-impaired travellers. Such programs would also be appropriate for other employees within terminals who provide services to the travelling public.	Initial implementation over two years, on-going maintenance of program.	Basic training materials would cost several hundred dollars per package. Allocation: terminal operators
On-board vehicles	10. On-board information should be provided in a form adapted to the abilities of communication-disabled travellers.	All communication-impaired travellers.	Information on safety measures and on-board facilities which is commonly provided in audio form should also be available in visual or printed form for hard of hearing and deaf travellers. Information which is commonly provided in printed form should also be available in a format adapted to the needs of partially sighted and blind travellers. This information may be best provided through direct human assistance.	Many elements of this measure are already in place.	Marginal costs of this measure would be minimal (under $25) on a per vehicle basis. Allocation: carrier

specific measure has a different priority. The priority is a function of the importance of the need being met, the ease with which the measure could be undertaken, the probability of success of the measure and the cost of development and implementation.

Based on these criteria, we feel that the following measures have the highest priority and should be implemented in the short term:

- Measure No. 1 - training of carrier personnel to deal with communication-impaired travellers. This measure is already in place to a large extent among the air and rail carriers and could be implemented over all carriers without difficulty. The probability of success of this measure is high since it can help remove the communications barrier between carrier personnel and communication-impaired travellers.

- Measure No. 3 - information and reservations for all major carriers should be available via TDD's. This measure is also partially in place and could be extended to all major carriers for relatively low capital costs.

- Measure No. 4 - assistance in making arrangements with intra-city transportation services. This measure would ensure that all communication-impaired travellers could obtain assistance in making arrangements with intra-city transportation services if such assistance was required.

- Measure No. 6 - coding of tickets to identify the special needs of communication-impaired travellers. This measure would help carrier personnel to identify the special needs of communication-impaired travellers as they are being processed through the terminal and while they are on-board the vehicle.

The measures which have the next level of priority and should be implemented over the medium term include:

- Measure No. 2 - an information guide for blind and sight impaired travellers. Such an information guide would help meet some of the trip planning needs of blind and sight impaired travellers. The guide could be produced on audio cassette tapes in order to maximize the accessibility of the information.

- Measure No. 8 - audio and visual arrival and departure announcements. Although virtually all terminals have some form of arrival and departure announcements, this measure would entail the development of appropriate standards for both the audio and visual forms of these announcements.

- o Measure No. 9 - awareness programs for non-carrier terminal personnel. Programs which increase the level of awareness of the needs of communication-impaired travellers are appropriate for all personnel who deal with the travelling public.

- o Measure No. 10 - on-board information in both audio and visual formats. Information which is provided on-board vehicles should be available in a format adapted to the abilities of communication-impaired travellers.

It was judged that the remaining measures should be implemented over the long term and therefore have a third level of priority. The measures in this category include:

- o Measure No. 5 - awareness programs for intra-city transportation service personnel. Although this measure would help remove some of the inter-personal barriers that communication-impaired travellers face, the degree to which Transport Canada can influence the actions of intra-city transportation service operators is limited. Therefore, the implementation of this measure may require the cooperation and active participation of agencies and jurisdictions which license intra-city transportation services.

- o Measure No. 7 - improved orientation information within terminals. The implementation of this measure should proceed over the long term because of the need to develop appropriate standards for signage, cueing and broadcast orientation systems.

Program Implementation and Monitoring

The first step in the overall implementation of the improvement program would be the refinement and approval of the suggested guidelines which address the needs of communication-impaired persons during the different stages of travel. This should follow the approval of the proposed Federal Policy on Transportation of Disabled Persons which has been developed by Transport Canada and which addresses the communication and information needs of sight, hearing and speech impaired travellers at a broad level.

The second step in the overall implementation would be the review, modification and approval of the specific measures of the program.

The final step in the overall implementation of the improvement program would be the on-going monitoring and periodic review of the recommended measures. The needs of communication-impaired travellers may change as their numbers and frequency of travel increase. On-going monitoring is required in order to identify how these new needs can best be met and what measures should be added, modified or dropped. In addition, further developments in the area of technological aids should be monitored. Advances in electronics are occurring continually and these advances are often

accompanied by reductions in cost. As a result, aids which are not technically or financially viable at present may be so in the future.

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1.0 INTRODUCTION

A number of studies are being undertaken by various agencies and organizations with the objective of improving the access to the national transportation system for the Canadian population with special needs. Among these projects there is no comprehensive study covering all phases of a journey and on all inter-city[1] public cariers for travellers with sight/hearing/speech impairments. Therefore, the Transportation Development Centre of Transport Canada considered it appropriate to conduct this present study with the objective of identifying and assessing the communication/information needs of travellers with sight, hearing and speech disabilities on board public transport vehicles and at terminals, and making appropriate recommendations.

The study is limited in scope in that it deals with the communication needs of sight/hearing/speech impaired travellers during all stages of inter-city trips made on public carriers. The study does not address intra-city travel nor travel made by private automobile. The stages of an inter-city trip include trip planning, access to and from the terminal, use of the terminal and travel on-board the vehicle. These four stages of a trip provide a framework for reviewing the needs of communications impaired travellers and identifying transportation system improvements which can help meet these needs.

The major tasks of the study include:

- estimation of the number of Canadians with sight, hearing and speech disabilities and their potential travel demand;
- identification of the communication and information needs of these persons during the different stages of an inter-city trip;
- identification and evaluation of the technological aids available to meet these needs;
- review of the practices and policies of inter-city carriers and government ministries and agencies with respect to communication-impaired travellers;

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1 The term inter-city refers to travel between cities, while intra-city refers to travel within one city.

- development of appropriate federal government guidelines to address the needs of communication-impaired travellers;

- development of an improvement program based on the above guidelines. The improvement program includes recommendations on both technological aids and human assistance.

The results of the first two tasks of the study are presented in Chapter 2. Chapter 3 describes the technological aids identified to meet the needs of communication-impaired travellers, while Chapter 4 presents the review of industry and government policies and practices. The final chapter of the report outlines in detail the proposed improvement program.

2.0 THE CANADIAN COMMUNICATION-IMPAIRED POPULATION AND THEIR INTER-CITY TRAVEL NEEDS

The objectives of this chapter are two-fold. The first objective is to present estimates of the communication-impaired population by type of disability and to estimate the potential inter-city travel demands of this group. The second objective is to specify the information/communication needs of these travellers during the different stages of an inter-city trip.

2.1 POPULATION ESTIMATES

There is an absence of basic data relating to the number of communication-impaired people in Canada and their demographic and socio-economic characteristics. Furthermore, the crude estimates which are available are not always consistent and do not provide a clear breakdown of the population by degree of impairment. As a result of the lack of basic data, most estimates of the communication-impaired population in Canada are based on prevalence rates developed through surveys carried out in the United States.

In the remainder of the section we present various estimates of the Canadian sight, hearing and speech impaired populations.

2.1.1 Sight Impaired Population

Estimates of the number of sight impaired in Canada were obtained from the following two sources:

- "Report on a Study of the Telecommunications Needs of the Blind and Otherwise Print Handicapped in Terms of Systems, Services and Devices" prepared by Hickling-Partners Inc. and published in March, 1981.
- "HEALTH OF CANADIANS" - a report on the Canada Health Survey published in 1981.

Estimates contained in the first report are based on American prevalence rates determined through a study conducted by the American Foundation for the Blind (AFB) under contract to the National Library Service, U.S. Library of Congress, entitled "Reading with Print Limitations', dated 1979. Sight impaired persons, as identified by this study, can be defined as those with limitations in seeing well enough to read regular print without undue difficulty, even with corrective lenses.

In the report by Hickling-Partners, the American prevalence rates were applied to 1976 Canadian census data. Exhibit 2.1 presents estimates for both 1976 and 1982. The 1982 values are simply the estimates made by Hickling-Partners factored up by the population growth over the period in each age group.

EXHIBIT 2.1

CANADIAN POPULATION ESTIMATES - SIGHT IMPAIRED

Estimates Based on Study Entitled "Reading With Print Limitations" by American Foundation for the Blind.

AGE GROUP	1976 ESTIMATES	1982 ESTIMATES
6 - 16	14,700	12,800
17 - 64	85,700	96,300
65 & Over	96,900	114,400
TOTAL	197,300	223,500

Estimates Based on Canada Health Survey as Documented in the Report Entitled "Health of Canadians"

AGE GROUP	1978-79 ESTIMATES	1982 ESTIMATES
0 - 14	96,000	94,000
15 - 64	786,000	829,000
65 & Over	318,000	349,000
TOTAL	1,200,000	1,272,000

EXHIBIT 2.2

CANADIAN POPULATION ESTIMATES - HEARING IMPAIRED

Estimates Based on Prevalence Rates from the U.S. National Census of the Deaf Population, 1971

AGE GROUP	1976 ESTIMATES	1982 ESTIMATES
0 - 19	199,500	188,500
20 - 64	1,000,000	1,135,000
65 & Over	1,263,500	1,491,500
Total	2,463,000	2,815,000
Profoundly Deaf		
Significant Bi-Lateral Impairment	744,000	850,000
Trouble in Hearing in One or Both Ears	1,518,	1,735,000

Estimates Based on Canada Health Survey as Documented in the Report Entitled "Health of Canadians"

AGE GROUP	1978-79 ESTIMATES	1982 ESTIMATES
0 - 14	127,000	124,000
15 - 64	549,000	579,000
65 & Over	352,000	386,000
TOTAL	1,028,000	1,089,000

The American study did not include children under the age of six and full time residents of health care institutions. These two groups would add approximately 7,000 and 50,000 respectively to the 1982 estimates.

The results of the Canada Health Survey, as documented in the report "The Health of Canadians", also provide data on the Canadian sight impaired population. The survey identified the population which has trouble in reading a newspaper or recognizing a friend across the street (with or without corrective lenses). The results of this survey are presented in Exhibit 2.1.

The estimates based on the U.S. prevalence rates identify more closely the target group of sight impaired transportation handicapped persons which is the focus of this study. Therefore, these estimates are used throughout the study, specifically as input to the evaluation of the various technological aids. The broader question used in the Canada Health Survey identifies a larger target group. This group may not require the aids used by the former group, but potentially they may benefit from the provision of the aids.

2.1.2 Hearing Impaired Population

Estimates of the number of hearing impaired persons in Canada are presented in Exhibit 2.2. The first set of estimates were prepared by the Health Programs Branch of Health and Welfare Canada in May 1977. The prevalence rates and definitions of degrees of impairment used for these estimates are based on the U.S. National Census of the Deaf Population, 1971. The prevalence rates were applied to the 1976 Canadian population. As was the case for the sight impaired population, the 1982 estimates are simply the 1976 values factored up by the appropriate growth rate in each age group.

The second set of estimates are from the Canada Health Survey. In this survey, the hearing impaired were defined as those with difficulty in hearing conversations even with the assistance of a hearing aid if one was normally worn. As before, these estimates were factored up to 1982 values.

There is close agreement between both sets of estimates if one assumes that the Canada Health Survey identified those people with profound or significant bilateral hearing impairments. These people are the target group of hearing impaired persons for the purposes of this study. However, the population which has trouble in hearing in one or both ears may also benefit from many of the aids developed for the more seriously impaired groups. The breakdown by age presented in the first set of estimates is used in the remainder of the study. This breakdown is being used since it is derived from a more comprehensive survey of the hearing impaired.

2.1.3 Speech Impaired Population

No published source of estimates of the speech impaired population in Canada was identified. A number of textbooks on speech pathology were reviewed and these provided estimates of U.S. prevalence rates by type

EXHIBIT 2.3

CANADIAN POPULATION ESTIMATES - SPEECH IMPAIRED
(as reported by Van Hattum)

DISORDER	PREVALENCE RATE	1982 POPULATION ESTIMATE
Articulation	3%	740,000
Voice	1%	245,000
Developmental (Permanent)	1/3%	80,000
TOTAL		1,045,000

ESTIMATES BASED ON NATIONAL HEALTH SURVEY

AGE GROUP	PREVALENCE RATE	1982 POPULATION ESTIMATE
Under 17 years	1.5%	95,500
17 to 64 years	0.7%	111,000
65 years and over	0.95%	22,500
TOTAL		229,000

of impairment. Exhibit 2.3 provides a summary of these prevalence rates and estimates of the population of speech impaired in Canada. The textbook used as a source for these rates was: "Communication Disorders, an Introduction" by R.J. Van Hattum, 1980.

The largest subgroup of speech impaired persons are those with articulation disorders. These disorders result from physical conditions such as irregularities in the structure of oral and nasal cavaties, auditory dysfunctions, which commonly result in defective articulation, or psychological conditions. The target population for this study does not include all people in this group, but the benefits from any aids implemented to assist the speech impaired would be shared by the group as a whole.

The next largest group, voice impairments, includes pitch, loudness and quality disorders. These disorders result from physical factors such as injuries or diseases which affect the vocal mechanism, psychological factors, or environmental factors such as air pollution.

The final group of speech impaired persons includes those with permanent developmental disorders such as: mental retardation, emotional disturbances, hearing impairments, and diseases affecting the central nervous system.

Another source of U.S. prevalence rates for speech impairments is the National Health Survey conducted in 1977. This was a household survey which included questions on a variety of disorders. In the area of speech impairments, the survey asked if anyone in the household had a cleft palate, harelip, problems with stammering or stuttering or any other speech defect. The prevalence rates by age group determined by the survey are presented in Exhibit 2.3. These rates have been applied to the 1982 Canadian population in order to obtain estimates of the number of speech impaired persons in Canada.

There is a substantial difference between the two estimates in Exhibit 2.3. However, this difference may be accounted for by the definitions used to identify speech impaired persons. For the purposes of this study, it is assumed that the second estimate represents the target population, while the first estimate includes both the target population and those with less severe impairments who may potentially benefit from any aids or technologies implemented to assist the target group.

2.1.4 Multiple Sensory Impairments

There is very little hard data on the prevalence of multiple sensory impairments. The following observations have been made in the reports referenced in the preceding sections:

- 25% of the sight impaired population have hearing problems, although only 1% are totally deaf;
- 50% of the sight impaired population are unable to get about with ease as a result of additional physical disabilities;

EXHIBIT 2.4

Total Canadian Communication-Impaired Population

Age Group	Impairment			Total
	Sight	Hearing	Speech	
Children	94,000	188,500	436,000	586,000
Adults under 65 years	829,000	1,135,000	506,500	2,136,500
Adults 65 years & over	349,000	1,491,500	102,500	1,830,500
Total	1,272,000	2,815,000	1,045,000	4,553,000

Target Population

Age Group	Impairment			Total
	Sight	Hearing	Speech	
Children	12,800	87,500	95,500	169,000
Adults under 65 years	96,300	438,500	111,000	594,000
Adults 65 years & over	114,400	554,000	22,500	657,000
Total	223,500	1,080,000	229,000	1,420,000

Additional Population Potentially Benefiting from Aids

Age Group	Impairment			Total
	Sight	Hearing	Speech	
Children	81,200	101,000	340,500	417,000
Adults under 65 years	733,700	696,500	395,500	1,542,500
Adults 65 years & over	234,600	937,500	80,000	1,173,500
Total	1,049,500	1,735,000	816,000	3,133,000

- o articulation impairments can result from hearing impairments;

- o sight and hearing impairments are correlated to age. 50% of the population with those impairments are over 65 years of age versus 10% for the general population.

In order to obtain estimates of the total Canadian communication-impaired population, multiple disabilities must be taken into account. Based on the limited available information it was assumed that 25% of both the sight and speech impaired persons also have hearing impairments. Exhibit 2.4 presents a summary of the 1982 population estimates for each group and for the communication-impaired population as a whole.

The total estimates are divided into two groups: the target population which includes those with more severe impairments and which is the focus of this study; and an additional group of communication-impaired persons who have less severe disabilities but who may potentially benefit from the aids and technologies implemented for the target group.

2.2 POTENTIAL TRAVEL DEMAND

Based on travel data published by Statistics Canada, the annual intercity trip rates by public carriers in Canada is 2.3 trips per capita for non-business trips and 1.5 business trips per adult under 65 years of age. The breakdown by trip purpose was estimated from the results of studies in the Toronto-Montreal corridor and should be viewed with caution.

In order to estimate the potential travel demand of the target and additional groups, the following assumptions were made:

- o children and adults under 65 years of age would have potentially the same non-business trip rate as the general population;

- o adults over 65 years would have a non-business trip rate half of the size of the general population (this assumption is based on the results of studies in the Toronto-Montreal corridor);

- o adults under 65 years would have a business trip rate half the size of the general adult population. Children and the elderly were assumed to have a business trip rate equal to zero;

- o communication-impaired persons would have the same modal split (i.e. the proportions travelling on air, rail and bus) as the general population.

The resulting potential travel demand is presented in Exhibit 2.5. In order to provide some perspective to these values, it was estimated how many travellers from the target and additional groups would potentially use the airports in a number of different cities across Canada. These estimates are only as valid as the assumptions listed above and

EXHIBIT 2.5

POTENTIAL TRAVEL DEMAND BY TARGET GROUP

MODE	IMPAIRMENT			TOTAL
	SIGHT	HEARING	SPEECH	
Air	42,100	196,700	51,400	266,900
Rail	9,000	42,800	11,400	58,100
Bus	30,700	147,400	39,700	200,300
TOTAL	81,800	386,900	102,500	525,300

POTENTIAL TRAVEL DEMAND BY ADDITIONAL GROUP

MODE	IMPAIRMENT			TOTAL
	SIGHT	HEARING	SPEECH	
Air	284,800	311,500	183,000	662,000
Rail	54,000	67,600	40,800	138,600
Bus	180,200	232,600	141,300	473,600
TOTAL	519,000	611,700	365,100	1,274,200

should be viewed with caution. The estimates are presented primarily to illustrate the potential scope of information needs of communication-impaired travellers.

Airport	Estimated Potential Communication-Impaired Travellers per Day	
	Target Group	Additional Group
Toronto International	190	470
Montreal International (Dorval)	95	235
Vancouver International	90	225
Calgary International	55	135
Halifax International	25	55
Quebec	10	25
Regina	10	25
Fredericton	<10	<10

2.3 INFORMATION/COMMUNICATION NEEDS

Inter-city travellers must receive information and communicate with public carriers throughout their journey. Information is needed on routes, fares, and schedules for trip planning, while communication is required to make reservations and to request for services. Information and communication needs extend to the access and egress, terminal and on-board portions of the trip.

Much of the information and communication that guides the inter-city traveller is conveyed by print, signs, audio messages or through dialogues with employees of the carrier. Problems are therefore created for sight, hearing and speech impaired travellers who do not have full access to the information provided by carriers and terminal operators.

Sight impaired travellers face both communication and mobility problems. These travellers rely heavily on audio and tactile sources of information. As a result, sight impaired travellers are often unable to use printed schedules and maps, and have difficulties with orientation in terminals, identification and pick-up of baggage. They rely on audio announcements and may have difficulties if these are unclear or incomplete.

On the other hand, hearing impaired travellers rely primarily on visual and tactile sources of information and must often communicate using visual signals. This group of travellers have special needs for those aspects of inter-city trips where information is orally transmitted such as making reservations by telephone or being informed of changes in departures and/or arrivals through audio announcements.

Speech impaired travellers have similar needs since they rely on visual and tactile methods to communicate their requests and responses to ticket agents and other service personnel.

EXHIBIT 2.6

INFORMATION/COMMUNICATION NEEDS AND POTENTIAL TECHNOLOGIES OR AIDS

TRIP ELEMENT	NEED	IMPAIRMENT GROUP	POTENTIAL TECHNOLOGY OR AID
PLANNING	- information on carriers/ modes	- hearing, speech	- teletext systems
	- reservations, schedule changes	- hearing, speech	- teletext systems
	- printed schedules, fares, and other travel information	- sight	- telephone schedule information, tactile systems
ACCESS/EGRESS TO AND FROM TERMINALS	- information and reservations for travel to and from terminals	- hearing, speech	- teletext systems, electronic signs in terminals
		- sight	- telephone schedule information
TERMINALS	- orientation upon arrival and travel within the terminal	- sight	- talking lights, audio guidance, loop system, tactile systems
	- arrival and departure information and gate location	- sight	- as above plus telephone schedule information
	- ticketing	- hearing, speech	- hearing aids, standard signage, sign language, artificial voices, paper and pencil
	- audio announcements, emergency alarms	- hearing	- loop system, hearing aids, visual paging, electronic signs
	- use of terminal facilities e.g. food services, washrooms, special services	- sight, hearing, speech	- loop system, tactile systems standard signage, electronic signs, artificial voices, paper and pencil
ON-BOARD VEHICLES	- communications with attendents for services, information and first aid	- hearing, speech	- hearing aids, electronic signs, sign language, paper and pencil, artificial voices
	- use of facilities/services	- sight	- audio guidance, tactile systems
	- information announcements both audio and visual	- sight, hearing	- audio guidance, tactile systems, visual paging, electronic signs

A summary of the information and communication needs of the communication-impaired travellers is presented in Exhibit 2.6. Needs are identified for each of four different elements of an inter-city trip. The type of impairment associated with each need is also listed, as are some of the technologies and aids which can meet these needs.

3.0 TECHNOLOGY ASSESSMENT

The material on Technology Assessment in this chapter is divided into three sections; each section deals with the technologies or aids applicable to sight, hearing and speech impaired travellers respectively. Within each section, there are descriptions of the various aids in terms of their operation and requirements. Key characteristics of the aids, such as cost, needs satisfied, compatibility and others are presented in tabular form at the end of each section.

A final section of the chapter draws conclusions as to which technologies or aids would be most appropriate to include in an improvement program for the removal of barriers for communication-impaired travellers.

3.1 AIDS FOR BLIND OR PARTIALLY SIGHTED TRAVELLERS

3.1.1 Broadcast Systems

3.1.1.1 Generic Description

Typically, broadcast systems transfer audio information directly from the information source to the listener utilizing a transmission other than sound waves. The method, therefore, requires the use of specialized transmitters and receivers. The advantages of using a broadcast system rather than simply using a public address amplifier and speaker include selectivity of audience and isolation from ambient noise.

A typical use of such a system would be to transmit orientation information to sight impaired travellers. The possible disadvantage that listeners would require specialized receivers could actually be an advantage because only those people with appropriate receivers could receive the broadcasts. In a terminal building, for example, the broadcasting of continuous orientation information might be regarded as objectionable noise pollution by many travellers. Equipping only those travellers who require the orientation information with receivers would satisfy all parties involved, in that those who require the information would receive it and those who do not require the information would not be distracted by it.

Three types of broadcast systems are described in the following sub-sections.

3.1.1.2 The Loop System

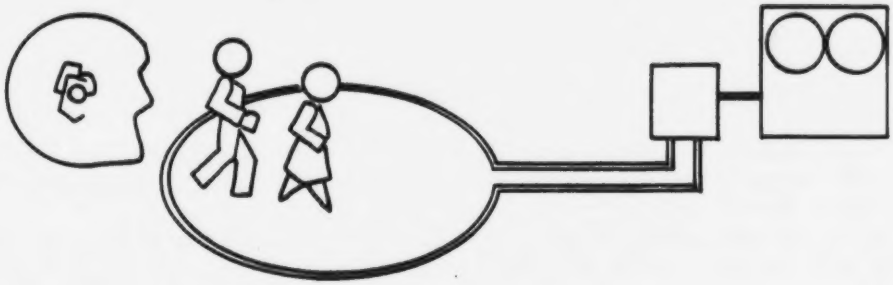
Operation

The simplest broadcast system is commonly referred to as the Loop System. In this system, the audio information to be transmitted is fed into a device very similar to a standard public address amplifier. The output of the amplifier goes to a loop of wire which must surround the area

to be covered by the transmitter, hence the name 'Loop System'. The actual transmission utilizes audio frequency magnetic field modulation. The receiver must therefore be capable of sensing, and converting to audio, this magnetic field.

Receivers

Hearing aid microphones do not pick up the received sound from a telephone handset very well. As it happens, inherent to the method of operation of many standard telephone handset earpiece speakers is the radiation of a magnetic field which is modulated identically to the output audio sound energy. To allow hearing aid users to more easily interface with telephones, most hearing aids have a 'T' or 'telephone switch' which enables the hearing aid to amplify and reproduce the audio signal recovered from a magnetic field, rather than the standard microphone input. A hearing aid with a 'T' switch is therefore an ideal receiver for the Loop System.



Receiving Information from a Loop System Transmitter

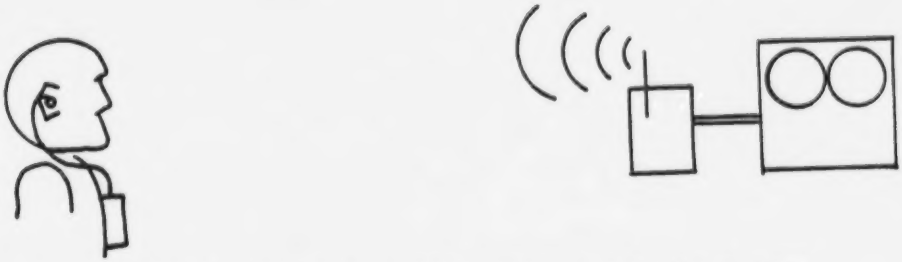
Due to the audio frequency baseband (that is no carrier frequency) modulation, only one 'channel' of information can be transmitted at a time, within a loop. This would be a limitation where it is necessary to transmit two or more types of information. For example, if it was desired to transmit orientation information to sight impaired travellers and the equivalent of public address announcements to hearing impaired travellers, then the likelihood of confusing all users would need to be carefully examined. A possible solution would be to utilize two separate loop systems, with physically separated transmitting loop antennas. Users would then need to be within the antenna loop transmitting the information they require.

3.1.1.3 Radio Frequency Systems

Operation

Another broadcast system utilizes radio frequency transmission similar to that used by radio stations. Two systems are presently in use, the difference being whether the radio frequency carrier is amplitude

modulated (AM) or frequency modulated (FM). Electronically, AM is slightly cheaper and simpler, but is more susceptible to electromagnetic interference from power lines, lightning, fluorescent lights, and the like. FM is therefore more popular due to the improved speech quality.



Receiving Information Through a Radio System

In either case, since the audio information is sent out as a modulation of a carrier frequency, then the receivers can be tuned to the specific carrier frequency and receive only the information on that channel. This means that, similar to a standard radio, several channels can be independently and simultaneously transmitted, and the receiver, depending on the channel it is tuned to, can selectively receive any one of the channels. Physically, the system requires a low power radio transmitter, an antenna and the corresponding radio receivers. If there are empty channels available in the locality's standard AM or FM radio bands and local radio regulations permit, then the radio transmissions could be sent over a standard radio frequency, and received by a standard AM or FM portable radio carried by the handicapped person.

3.1.1.4 Talking Signs

Description

A technology which is a broadcasting extension of Audio Guidance (section 3.1.2.2), is often referred to as Talking Lights or Talking Signs. This system addresses the problem of 'macro' level orientation for sight impaired people in that Talking Signs replace standard visual signs.

Operation

The system utilizes an infrared light beam which is modulated with audio information. Typically, a light beam transmitter will be associated with, and adjacent to a standard visual sign and the audio message modulating the light beam will be the contents of the sign, hence the name 'Talking Sign'. The receivers convert the modulated light back into an audio message. This is therefore a type of audio guidance system in that information is made available to visually impaired travellers to aid their navigation and orientation. This is also a type of a broadcast system in that information is transmitted to travellers equipped with suitable receivers. As with other broadcast systems, this one avoids the potential noise pollution problem of simpler audio guidance systems because listeners require a receiver. A unique advantage of this particular broadcast system is that of the directionality of the light beam. This,

combined with the Talking Signs' transmission range of hundreds of feet would allow a visually impaired traveller to 'home in' on a distant sign. For example, a 'Men's Washroom' Talking Sign would enable a visually impaired traveller to independently find the washroom, and to quickly identify its exact location and 'gender' even in a large and crowded transportation terminal. Likewise, the system could be used to identify stores, services, areas, directions as well as room numbers, addresses or even street signs.

Use of a Talking Sign System

A Typical Installation

To best describe how a system utilizing Talking Signs would operate, a possible scenario is outlined below.

A sight impaired traveller, upon entering an airport terminal for example, would be given a Talking Sign receiver. (Note that until Talking Sign systems become much more prevalent, it could not be assumed, or required, that sight impaired travellers would have their own receivers. In addition, a deposit, or other method of ensuring the return of the receivers, may be required.) The sight impaired traveller would then be free to independently navigate through the terminal.

The Talking Sign receiver must be aimed at a transmitter to receive that transmitter's message; therefore, just as a sighted person 'looks around' for signs, the sight impaired traveller would survey all of the Talking Signs for the pertinent ones by scanning the area with the receiver. Talking Signs indicating the various airline counters, customs areas, restaurants and the like would be transmitting from each service area. By walking towards the source of the transmission, as indicated by the receiver, the sight impaired traveller would be able to independently locate and go to desired areas. Carrying the scenario further, once finished at a ticket counter, a Talking Sign indicating the gate area would lead the traveller to it, and further Talking Signs in the gate area would lead the way to specific gates. At some point, presumably before leaving the terminal building, the Talking Sign receiver would be returned. In the

future, it is possible that frequent travellers would own their own receiver.

A Talking Sign system has been in use for several years on one floor of the Smith-Kettlewell Institute of Visual Sciences in San Francisco, California. An installation is also planned in the Capital Children's Museum in Washington, D.C.

3.1.1.5 Summary of Broadcast Systems

All of the broadcast systems require transmitters and can send audio information from a source directly to a person who has a suitable receiver. The differences between the systems are summarized below.

The Loop System requires the receiving area to be completely surrounded by the antenna; only one 'channel' within a loop antenna is available; the transmitter is basically a standard public address amplifier; and the receiver can be a standard 'T' switch equipped hearing aid.

AM and FM radio systems are more complex due to the use of radio frequencies, but offer the possibility of increased performance. The antenna need only be a few feet of wire; as many channels as are available in the local radio spectrum may be used; and the receiver is similar to a standard portable radio.

Talking Signs are the most unique, and offer the advantages of: directionality, allowing users to 'home-in' on a destination, and independence from broadcast regulatory agencies or possibility of interference.

3.1.2 Audio Information Systems

3.1.2.1 Introduction

Recognizing that visual information so freely available to non-disabled people is of limited or no use to visually impaired persons, audio information systems attempt to duplicate visual information with audio information. Two types of such systems are described below along with some examples for each.

3.1.2.2 Audio Guidance

One of the significant barriers to independent travel for communication-impaired people is that of navigation and orientation for sight impaired travellers. For many situations, duplicating visual information with audio messages is a reliable means of making the information available to most travellers. Recent advances in speech output technology have now made it feasible to offer audio information in public places. For clarity, two examples of such an audio information or audio guidance system will be given.

Example 1 - Automatic Station Announcements

The Toronto Transit Commission (TTC) is presently implementing, on an evaluation basis, an Automatic Subway Station Announcement System. The TTC has recognized the problem sight impaired subway riders have in independently determining at which stop their train is approaching or stopped. As an additional aid to sighted travellers, an electronic sign, similar to those described in section 3.2.1.5, displays the station name.

System Operation

There are presently at least two methods of operation of Automatic Station Announcement Systems. The TTC system utilizes transponders mounted between the subway tracks, as well as two microprocessor-based electronics packages on board each equipped train, one for the electronic sign and one for the audio announcer. Two transponders (per track) are required. As the train moves over a transponder, the transponder sends a coded message back to the train indicating which station is being approached. The transponder need only transmit a station code to the passing trains. Equipment on the trains then have the intelligence to generate the required speech and signage from the received code.

A station announcer system presently being evaluated by the Montreal Urban Community Transport Commission (CTCUM) operates in a slightly different manner. The station mounted equipment continuously transmits the complete audio message which, in turn, is received only by trains nearby (that is, in the station). In this case, the train need only receive and amplify the message, and the bulk of the intelligence is contained in the station mounted equipment.

An example of the operation of the TTC system is as follows: when the subway train becomes within 150 metres of a station, the announcement (for example 'Next stop, Davisville Station') begins and the electronic sign displays and flashes the station name. When the train is actually stopped at a station, then the announcement 'Davisville Station' is repeated and the electronic sign displays 'Davisville'. The system requires equipment mounted on the trains as well as equipment mounted in the stations. TTC has installed the required equipment in six stations and two subway cars for a six month evaluation.

The advantages of the TTC system, as compared to the CTCUM proposed method, are that: the speech quality should be better since the speech is generated on-board the train rather than transmitted over a radio link, and, due to the on-board train intelligence, features such as the on-board electronic signs are easier to implement.

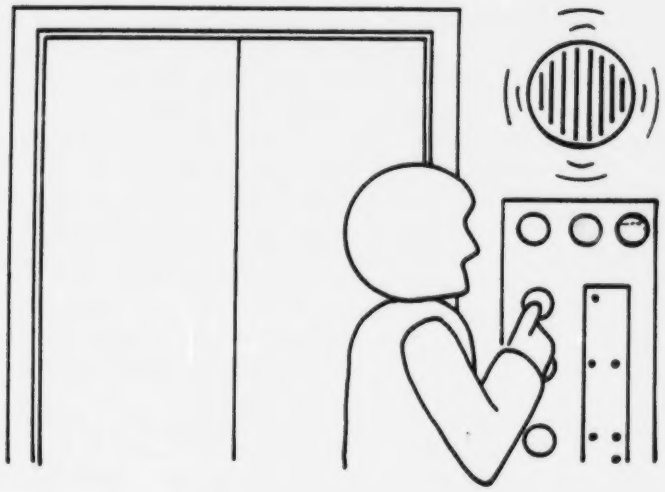
The advantages of the CTCUM system are that: there is no chance for a wrong message to be spoken (if there is a problem with the transmission then the speech will be unintelligible; on the TTC system, if a wrong code is picked up an incorrect message would be broadcast), and the CTCUM system will generally be less expensive. This is because the bulk of the expense of station announcement systems is for the speech generation equipment. The CTCUM system has the speech equipment station mounted, and there are generally fewer stations in a subway system than subway cars.

Example 2 - Elevator Floor Announcer

Similar in utility and benefit to the Station Announcer described above, Elevator Floor Announcers are becoming popular in North America due to the recently acknowledged rights of equality for the disabled, coupled with the improved reliability, voice quality and cost-effectiveness of the latest digital speech synthesizer products. Sight impaired elevator users have difficulty in using elevators without assistance, particularly in determining what floor stops have been requested and in confirming floor stops as they occur. While sight impaired subway riders could count stops by depending on the fact that a subway train always stops at all stations, a sight impaired elevator rider has no way of knowing exactly where he is, since there is no way of knowing how many floors go by between stops. The control panel could easily be enhanced to include Braille legends beside the push buttons to indicate the floor numbers, but indicating to elevator riders the floor the elevator is at is a more complicated problem.

There are at least two ways of doing this. One system, in use at the Helen Keller Institute in New York, uses floor select buttons which stay pushed in until the corresponding floor is reached, at which time, it pops out. A sight impaired user would keep his or her finger on the button to sense this, and then they would already be at the front of the elevator so that they could easily exit. Major problems with this system are that: sight impaired users must 'monopolize' the buttons; the system involves mechanical movement (which is always prone to failure); and it would be prohibitively expensive to retrofit existing installations with this system.

An alternative means of providing floor information to riders would be to audibly announce the floor. This would have the added benefit of allowing all elevator riders to hear the floor number. This is important when there is more than one sight impaired person in the elevator, when the elevator is crowded and one cannot gain direct access to the buttons or when a short or wheelchair bound person cannot look up high enough to see the floor numbers. Elevator manufacturers are now offering such announcement systems as an option to new elevator installations, but they cannot be installed on existing elevators. There are systems being offered which are specifically designed to be easily retrofitted onto existing elevators. The only known Canadian manufacturer is EVA Corporation of Ottawa.



An Elevator Floor Announcer System

System Operation

When riders enter the elevator, they press their desired floor buttons as they normally would. Before the elevator doors close, the system announces that the doors are closing and which direction the elevator is going. As the elevator starts moving, the system announces all destination floor numbers in the order of arrival. As the elevator is stopping and before the doors open, the system announces the floor. Special names such as 'lobby', 'main floor' or 'garage' can be programmed.

3.1.2.3 Automated Telephone Information

In major airport terminals up-to-date departure and arrival time and gate information is usually available on video monitors. The same information is available from information operators when, for example, calling from home. Unfortunately, video monitors are of no use to the visually impaired traveller and requesting specific information by telephone can be difficult for the speech or hearing impaired traveller. An aid, often referred to as Automated Telephone Information, is available which can efficiently and effectively remove these information barriers to speech and sight impaired travellers. Indeed, a simple extension of the system can make this information easily available to deaf travellers using Teletext systems (described in section 3.2.2) such as teletype or the Visual Ear. The system can also be of significant benefit to non-impaired travellers as well as the carrier supporting the information service.

Basically, the system requires that each piece or group of information be associated with a telephone number. The resulting block of telephone numbers would then access a computer which has the capability to

speak the desired information with no further user input required, other than initially dialling the specific telephone number. Such systems are already in use in many cities in North America providing local bus schedule information.

System Operation

The bus schedule Automatic Telephone Information Systems, are supplied by Teleride Developments of Toronto. The operation of the system is as follows: each bus stop (or group of bus stops, if they are close together) in one direction is assigned a stop number. Before leaving for the bus stop a transit rider would phone the telephone number associated with his or her bus stop and receive an up-to-date reply giving the scheduled arrival time in minutes of the next two or three buses scheduled to arrive at the bus stop. Additional information is also automatically given concerning delays, detours and the like. The systems are economically justified by the resulting increase in transit use due to the improved availability of accurate information, and therefore the reduction in waiting time at the bus stop. An option is available which would allow deaf transit users to receive the responses directly on their teletypes or Visual Ear devices.

In the case of airport information, telephones located throughout the airport as well as any other telephone in the city could dial into the airport's information computer. By dialling, for example, the first three letters of the flight's destination city, a caller could hear a reply giving the updated departure time and gate information for all flights leaving for that city starting with the earliest and continuing with the rest of the departures for that day.

These systems have already proven to be of significant benefit in mass transit systems. The carrier benefits by being able to reduce telephone information centre staff due to the high percentage of routine information calls which the system can automatically handle. This leaves the airline's telephone staff available to handle more complex inquiries and to make reservations. The callers benefit by having up-to-date information quickly available, even during peak calling times. Communication-impaired travellers could benefit by being able to independently obtain the schedule information they need.

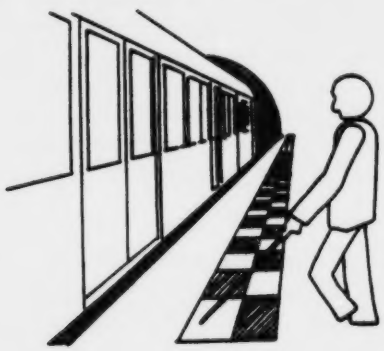
3.1.3 Tactile Information

3.1.3.1 Introduction

A major obstacle sight impaired travellers face is that of navigation and orientation. In addition to using audio information to overcome these obstacles, sight impaired travellers can use their sense of touch. Information available through the sense of touch is often referred to as tactile information. Three examples of tactile information as they would apply to aiding navigation and orientation follow.

3.1.3.2 Tactile Warning

A specific, and potentially, vitally important danger which sight impaired people face is that of not knowing about hazards until they hear or feel something. In many situations, therefore it should be a first priority to provide advance warning to sight impaired people. The TTC, for example, is presently testing a textured warning strip installed on subway platforms several inches from the edge. This allows sight impaired subway riders using canes to know where the edge of the subway platform is without having to walk too close to the edge of the platform. The warning strips have a texture specifically designed to be easily discerned by caning and are also coloured yellow and black to provide a visual warning for partially and even fully sighted patrons.



Tactile Warning Strips

Tactile warning strips are called for at stairways in the "Barrier Free" design standards of Public Works Canada. These standards will apply shortly to all new federal buildings and may apply to existing buildings as well.

3.1.3.3 Tactile Maps

Although caning, and other aids such as the warning strips described above, provide navigation information on a 'micro' level, there is still a need for information on a 'macro' level. For example, sight impaired travellers need the answers to such questions as:

> What is the general layout of a building? In which direction is Gate D? Where are the washrooms, and which one is the Women's?

Information such as this is usually available to sighted persons from large maps, such as those often found in shopping malls, or from signage. Neither of these navigation aids are of use to many sight impaired traveller. Efforts have been made to duplicate the large maps with tactile maps. The effort in this case is to utilize textures and tactile symbols to represent different obstructions, services, designations and areas. Evaluations of such tactile maps have been made and results have shown that large tactile maps are a somewhat less than optimal solution. A specific problem is the uneasiness and pressure of using such a 'high profile' and noticeable aid

in a busy public place. Another problem is that of remembering a complex route through a large building, especially in light of the dilemma a sight impaired person would be in if he or she became 'lost' in a building while attempting to follow remembered directions. An improvement then, is to use smaller tactile maps which are inexpensive enough to be distributed, in advance, to future (sight impaired) visitors of the building. It would then be possible for the maps to be reviewed and any ambiguities resolved before the actual trip is made. Once in the building, the maps could be carried by the user, so that they can be referenced while enroute to their particular destination within the building.

Technologies

There are at least two technologies for making tactile maps; embossed paper and vacuum formed plastic.

Embossed paper tactile maps are generally simpler and more suited to large volume production. They consist of raised outlines, usually denoting walls or paths, as well as simple symbols and braille legends. Frontier Airlines in the United States has such a map designed to be the equivalent of the aircraft safety card, for use by their sight impaired passengers. The card has a raised outline of the aircraft and has symbols showing emergency exists, washrooms and the like.

It is not possible to present very much information on a small card due to the limited range of easily discernable patterns which can be reliably and effectively embossed on paper. Another problem with this technology is the difficulty and expense of making the embossing dies.

Vacuum Forming

This process requires that a 'master' be made of the tactile map, and then a heated sheet of plastic is placed over the master, the air is drawn out, causing the shape of the plastic to closely conform to that of the master, and the plastic is allowed to cool, and therefore harden, leaving a durable replica of the master tactile map. The Canadian National Institute for the Blind (CNIB) in Toronto has the required equipment to make such maps. Generally, they use their "Thermo-Former" to reproduce maps, diagrams and other illustrations from standard textbooks that their Braille Department is converting for use by the blind.

Due to the superior formability of plastic and other materials which may be used in a Thermo-Former, much more detailed textures and shapes can be reproduced than is possible with embossed paper. The master is made up using any available materials with the required textures, such as sandpaper, wallpaper, beads, blobs of glue, spaghetti and so on. One of the more important rules in designing and making up comprehendible tactile maps is to ensure they are simple and uncluttered. Overly detailed maps become 'unreadable'.

3.1.3.4 Tactile Computer Communications

Description

Presently, and at an accelerating rate, individuals are interacting with the many data banks supported by private companies, governments and newspapers. It is envisioned that many of these data banks, the most popular one being Telidon, will contain travel information. The problem then arises of conveying computer output to sight impaired people. This problem has already been recognized, and has been the subject of a grant from the Department of Communications. This work has resulted in the development of a computer output device which, rather than printing characters on paper, can emboss relief dots on paper. These dots can then be 'read' by sight impaired persons. This 'tactile printer' has two output modes; in the more simple mode, it can print Braille at a rate of ten to twenty characters per second. In the graphic mode, drawings, charts and other pictorial output may be represented in relief, so that sight impaired people can 'read' them. The utility of such a printer is vast. For example, a data base of building layouts could be made available, and a sight impaired traveller could independently obtain tactile maps, as described earlier in this section, of destinations before actually leaving for them. Other sources of information such as Braille dictionaries, which are very large and expensive, could be made accessable from a computer terminal and requests would be made to print only the output which is needed. The printer can also be connected to a standard computer terminal keyboard, so that characters typed on the keyboard are printed on the Braille printer. This would enable any person able to use a standard keyboard to produce Braille output.

3.1.4 Conclusions - Aids for the Sight Impaired

Some of the important characteristics of the technological aids for blind and partially sighted persons are summarized in exhibit 3.1. Note that each aid is only suited to use in certain phases of a typical inter-city trip. The aids feasible for use during the phases are described below.

The planning stage of a trip involves learning about carriers and modes of travel and then subsequently obtaining information on schedules and fares. Ultimately, reservations need to be made with possible further changes. In this stage of a trip, a sight impaired person would have difficulty with sorting through and comparing printed schedule and fare information. Aids such as Automated Telephone Information and Tactile Communications would help sight impaired travellers independently overcome their handicaps. Both of these aids allow information to be transmitted to a remote location from the source using the telephone.

The next stage of a trip is the access and egress to and from a terminal. The traveller would be interested in information and reservations for travel to and from the terminal. Telephone schedule information could be of use here, for instance to find out when the next airport bus leaves from a particular subway station or shopping plaza.

EXHIBIT 3.1
AIDS FOR THE BLIND OR SIGHT IMPAIRED

CHARACTERISTIC	Loop System	Radio Systems	Infrared Light Systems
Costs	$100 per receiver $250 per transmitter (plus installation of the loop antenna)	$75 per receiver (if a standard AM or FM radio is used) $750 per transmitter	$200 per receiver (one per person using the system) $400 per transmitter (including installation - one per sign)
Needs satisfied	- provides information normally on signs and displays to sight impaired travellers	- provides information normally on signs and displays to sight impaired travellers	- provides orientation and navigational information for sight impaired travellers in audio form
Flexibility/Selectivity	- can also operate outside of buildings - users must be able to hear - very selective - only users with appropriate receivers would even know about the system	- can also operate outside of buildings - users must be able to hear - very selective - only users with appropriate receivers would even know about the system	- users must be able to hear - very selective - only users with appropriate receivers would even know about the system
Compatibility with Present Systems	- would also broadcast to hearing aid users who are within the antenna and using their 'T' switch - for instance those using a telephone	- no interference if locally unused radio frequencies are used	- would not interfere with or be susceptible to interference from other systems - is independent of all other systems
Compatibility with Utilities	- approval of antenna wiring may be required from the local electrical utility	- approval for the transmitter may be required from the Department of Communications	- only requires 110v a.c., about as much current as a calculator. Otherwise is independent of all utilities
Ease of Implementation	- retrofit installation of transmitting antenna loop may be difficult - control of issuing of receivers required	- control of issuing of receivers required	- only one manufacturer presently - only a few minutes of training for use are required - control of issuing of receivers required - each transmitter (sign) site requires 110v a.c. supply
Status of Development	- well proven but not widely implemented	- well proven but not widely implemented for this purpose	- available, but not widely used or proven

EXHIBIT 3.1 (continued)

AIDS FOR THE BLIND OR SIGHT IMPAIRED

CHARACTERISTICS	Elevator Floor Announcer	Automated Telephone Information
Costs	$7,000 per elevator (including installation)	$100,000 and up - one system can simultaneously handle the information requirements for several carriers at one time
Needs satisfied	- provides navigational information for sight impaired travellers	- provides schedule, gate, track and other such changable information to callers by telephone
Flexibility/Selectivity	- all users of elevators with the Floor Announcer equipment hear floor stop announcement - announcements could be made bilingual	- available to anyone with access to a telephone - can also work with teletypes and other telephone devices for the deaf (TDDs) - can handle more than one airline, bus line, etc. at one time - message can be bilingual - any type of audio information can be provided (gate, train, flight, bus . . .)
Compatibility with Present Systems	- is flexible enough to work with any elevator	- can remove routine workload from telephone personnel, leaving them free to handle complex information inquiries, reservations and the like
Compatibility with Utilities	- may require electrical utility approval	- requires a special, but tariffed (that is, telephone companies can offer it on request) telephone service
Ease of Implementation	- can be installed by any elevator technician	- system is available 'turn key', that is, supplier does installation, and assists with marketing to public, etc.
Status of Development	- commercially available and tested	- commercially available and proven

EXHIBIT 3.1 (continued)

AIDS FOR THE BLIND OR SIGHT IMPAIRED

CHARACTERISTICS	Tactile Navigation	Braille Computer Output
Costs	$0.50 - each map $1000-$5000 - one time graphics cost	$4,000 - still in development stage
Needs satisfied	- provides navigational information for sight impaired travellers	- enables sight impaired persons to directly 'read' computer output text or graphics
Flexibility/Selectivity	- initial orientation required - users must be able to follow a tactile map - very selective - does not interfere with other travellers	- can emboss paper with Braille or graphics - can receive input from a computer, keyboard or another computer over telephone lines by using an acoustically coupled modem
Compatibility with Present Systems	- would not interfere with, or be susceptable to interference from other systems - is independent of other systems	- uses same interface as a standard computer output printer would use
Compatibility with Utilities	- does not require any utilities	- using a standard acoustic coupler can interface with any telephone
Ease of Implementation	- an experienced person to design and make the master map is required - maps should be available from travel agents, or the CNIB to allow sight impaired travellers to study them in advance	- as easy as using a standard printer
Status of Development	- CNIB in Toronto can make such maps, but are understaffed and rely on volunteers	- prototypes have been built, used and tested

After the above steps, a traveller would find him or herself at the transportation terminal. The demands on a traveller at this point are numerous. Initially, a traveller would need orientation information about where he or she is versus where the desired services are, such as ticket counters, customs office, washrooms and food services. A traveller would then need to confirm arrival or departure times, buy tickets, check in or have some other interactive communication with a ticket agent. While in the terminal, attention to and awareness of emergency conditions, changes and other events is necessary.

Orientation and navigational information for sight impaired travellers could be made available through the various broadcast systems such as Talking Signs, audio guidance such as on Elevator Floor Announcers, and tactile systems such as Tactile Maps.

Both sight impaired and non-handicapped travellers could confirm schedules through the use of Automated Telephone Information.

On-board vehicles, a traveller needs to communicate with attendants, conductors or drivers, as well as other passengers. Use of the facilities or services on the vehicle may be needed and knowledge of present or pending situations, departures, arrivals and conditions is also needed. A sight impaired person could make use of tactile maps and possibly a broadcast or audio guidance system to locate on-board facilities. Other systems, such as an electronic announcer and tactile maps could be used to provide information about the vehicle and changing situations, such as arrivals.

3.2 AIDS FOR THE DEAF OR HARD OF HEARING TRAVELLERS

3.2.1 Signage Systems

Signs and other visual displays are a very efficient replacements of public address announcements for hearing impaired travellers. By duplicating audio announcements with visual signs, hard of hearing and deaf travellers are assured of being aware of all messages. The signs augment the audio announcements and can serve to provide additional detailed information not easily remembered from audio announcements, such as a series of late arrival times or track changes.

3.2.1.1 Non-Changeable Signs

Many levels of complexity are possible. The simplest is a fixed or non-changeable sign. Such signs are usually painted, although silk-screening, plastic moulding and other variations are used depending on specific requirements such as size, necessity of outdoor use and so on.

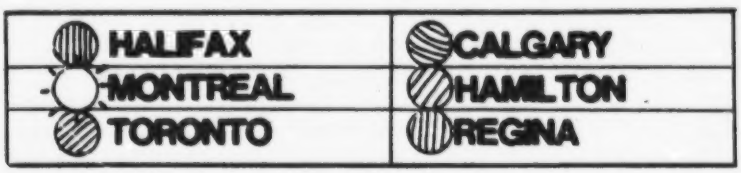
3.2.1.2 Changeable Signs

Of interest in this report are changeable signs. The simplest changeable signs are only a small step less trivial than the fixed signs described above. Many schemes utilizing magnetically secured or plastic shapes are available. The disadvantages of manually changing and recomposing the sign and of the necessity of being physically close to the

sign to change it rule out many of the potential applications for such signs.

3.2.1.3 Visual Paging

The next level of complexity could be referred to as 'visual paging'. This system utilizes a sign with a number of fixed messages which may be backlit or have an adjacent light illuminated to highlight the valid messages. This system has the advantage of remote control but the disadvantage of a limited vocabulary.



Visual Paging Sign

3.2.1.4 Electronic Signs

The most flexible variation of signs would come under the class of 'electronic signs'. Such signs are usually made up of a 'dot matrix' of lights or indicators. By illuminating or controlling specific dots, characters and numerals can be formed to construct unlimited vocabulary messages.

3.2.1.5 Examples

All of these types of signs are already in use in many terminals, including airports and rail and bus stations. Obviously, fixed signs are predominant both inside and out of terminal buildings. Changeable plastic signs are often used at gates, tracks or bus bays to indicate a particular flight, train, or bus route number, departure time and destination. In airports, visual paging is often used on metal detectors to indicate whether the next person should wait, or walk through. Electronic signs, in the form of video monitors, are used to display departure and arrival information. Electronic signs in the form of 'flip dot' displays or light emitting diode matrices are used to display flight numbers at baggage carousels.

3.2.2 Teletext Systems

Initial planning of a trip is usually an interactive process in which two-way instant communications between the potential traveller and the information source is necessary. By far, the most established communication medium for these needs is the telephone. However, some speech and hearing impaired people cannot use a standard telephone set. A class of

communication devices, commonly referred to as 'Telephone Devices for the Deaf' or 'Teledevices for the Deaf' (TDDs) are available to allow speech or hearing impaired people to communicate using telephone lines. The transmitter of such devices consists of a keyboard on which messages are typed. The message then is transmitted over the telephone line and appears on a printer or a small alphanumeric display on the recipient's TDD.

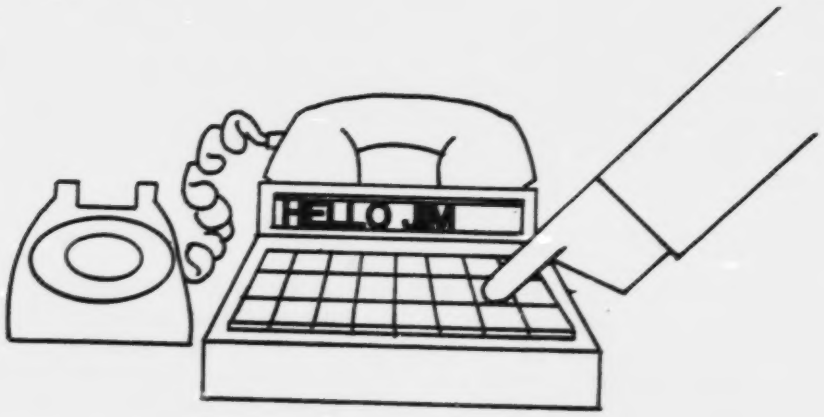
3.2.2.1 Background and History - Mechanical TDD's

After Morse code became obsolete, the wire services used teletypes to transmit message. Teletypes are large (0.5m x 0.5m x 1m), heavy (50Kg) mechanical devices which consist of a keyboard and printer. The machines, and the code which the characters are converted to (for transmission) is optimized for alphanumeric messages. This code, called Baudot code, is not expandable and several years ago the rapidly expanding communications needs of industry necessitated the adoption of a more powerful code able to deal with higher speed transmission, upper and lower case characters, data transmission and other such expanded functions. A new code (incompatable with Baudot) designated the American Standard Code for Information Interchange (ASCII) was designed and accepted as a standard. The extremely large installed base of Baudot teletypes therefore became obsolete and available for use by others. Baudot code is entirely adequate for the needs of the deaf.

It soon came to light that there are problems with using teletypes as the standard telecommunications medium for the speech and hearing impaired. The first is that the teletypes are not portable, as a travelling disabled person would require. The second is that there simply are not enough teletypes to go around. Other problems include the disturbingly great amount of noise teletypes make and the size and weight of them.

3.2.2.2 Electronic TDDs

For all of the above reasons several manufacturers now make a TDD which uses Baudot code (and therefore is compatible with the mechanical TDDs), but uses electronic components throughout, and is therefore small (about the size of a textbook) and portable. These TDD's are battery operated and interface to a telephone by simply placing the handset over a built-in acoustic coupler.



Telephone Communication Using a 'Visual Ear' Teletext Device

Due to the present improved availability of TDDs (since the introduction of the electronic versions) and the recently increased awareness of the needs and rights of the disabled, many public and private institutions are now providing a TDD service telephone line for callers.

Although a number of services are now available via TDD, the time required to communicate using this technology is substantially longer than by regular telephone. Long distance rates are lower for users of this equipment, thereby partially reducing the impact of this problem.

3.2.3 Sign Language

The traditional method of person to person communication between persons with profound speech or hearing impairments is sign language. There are two basic types of sign language. The older and more traditional type is American Sign Language (ASL).

ASL is like a shorthand, in which communication takes place through the use of hand motions and facial expressions to represent ideas and emotions rather than full, grammatically correct sentences. For example, a literal translation of 'I am going to the park' would be 'Me go to park'. Note that the idea is conveyed, but correct grammar is sacrificed for efficiency of hand motions and speed of communications.

Due to the use of ASL as a primary means of communication, speech or hearing impaired persons seldom obtain a good command of English grammar. This causes an additional handicap for them when trying to integrate with non-handicapped persons (through writing, for example). Largely for this reason, there has been a switch towards teaching Signed English (SE).

SE is a literal translation of English; that is, there is a hand motion or signal for every needed word. This ensures that proper English grammar is learned.

Both ASL and SE have a common set of hand symbols for the alphabet letters. It is therefore possible that words for which one of the parties do not know the symbol can still be communicated or taught.

3.2.4 Hearing Aids

For completeness, hearing aids are included in this evaluation. A signficant number of the hearing impaired population, particularly those of older age, do not use hearing aids even though such a device could improve their hearing. This is generally because hearing impairments due to old age typically begin as negligible problems, and only slowly become worse. A sufficient need to justify obtaining a hearing aid is often not felt by the one needing it, although others who may need to deal with this person may feel differently. Hearing aids normally pick up their input from a small built-in microphone. Because the microphone does not pick up the sound from a telephone earpiece very well, most hearing aids also have a switch (the 'T' switch) which enables the hearing aid to receive input from a built-in induction loop which can sense the magnetic field produced by the telephone earpiece. This 'direct coupling' of the hearing aid to

the telephone results in an acceptable sound reproduction of the received voice.

As described above, the hearing aid depends on the magnetic field emitted by the telephone earpiece as the source of the received audio. A few years ago, Northern Telecom, the primary supplier of telephone equipment to Bell Canada began supplying along with their telephone sets a newer earpiece design which did not produce a magnetic field. This 'Bar Receiver' which uses electrostatic rather than electromagnetic technology, was discontinued when the problems it caused for hearing aid users became apparent. The end result is, however, that there are a signficant number of these Bar Receivers installed on Bell Canada equipment.

In other provinces, British Columbia for example, new telephone sets are normally supplied with the new electrostatic design earpieces, and therefore do not work with hearing aids. For an additional charge of twenty to thirty dollars, BC Tel will change the earpieces to the electromagnetic type which will work with hearing aids. There is an on-going program to convert pay phones to the electromagnetic type so that hearing aid users can use them. So that converted pay phones can be easily identified, a blue strain relief grommet is installed on the cable at the base of the handset.

Most telephone companies offer a small portable coupler which will convert the acoustic energy (which any earpiece produces) into the magnetic energy which hearing aids can use as input. Unfortunately, portable couplers are not compatible across Canada because of differences in the electronics of earpiece designs.

3.2.5 Paper and Pencil

This non-technological aid is included to remind us that technology, as powerful as it is, has its place and that sometimes the simplest way of getting around an obstacle is the best. The availability of a person with the time and understanding to deal with disabled persons may be the optimum solution.

Assuming manual dexterity and literacy, a paper and pencil form of communication is all a speech or hearing impaired person really needs for many of the information needs encountered in making a trip.

3.2.6 Conclusions - Aids for the Hearing Impaired

Exhibit 3.2 highlights the features of the aids for hearing impaired travellers, as described previously in this section. The aids are also summarized below according to which stage of a typical trip they are most beneficial for.

The trip planning stage, and particularly the interactive information, reservations and changes stage cannot be handled by a hearing impaired person without special assistance. As these types of communication usually take place by telephone, the use of one of the teletext systems would be the most feasible aid for deaf persons. Hard of hearing persons

EXHIBIT 3,2
AIDS FOR DEAF AND/OR HARD OF HEARING TRAVELLERS

CHARACTERISTICS	Standard Signage	Visual Paging	Electronic Signs
Costs	- $100 and up	- $1,000 and up	- $1,500 and up
Needs satisfied	- provide fixed information to travellers - may be locally changed	- provides changeable messages to travellers - remotely controlled	- provides up-to-date and easily changed information - remotely controlled
Flexibility/Selectivity	- signs can be made any size, colour, language and level of flexibility - available for all to see		
Compatibility with Present Systems	- can enhance present audio systems by providing visual redundancy		
Compatibility with Utilities	- independent of utilities other than requiring power		
Ease of Implementation	- careful planning to avoid 'visual pollution' and possible confusion required		
Status of Development	- commercially available and proven		

EXHIBIT 3.2 (Continued)
AIDS FOR DEAF AND/OR HARD OF HEARING TRAVELLERS

CHARACTERISTICS	Sign Language	Hearing Aids	Paper and Pencil
Costs	- significant training costs (several months per person) for full comprehension	$250-$300 - depends on type	- negligible
Needs satisfied	- enables person to person communication when one of the parties is speech or hearing impaired and both parties know some sign language	- may improve a hearing impaired person's hearing to a level which will allow normal activity - effectiveness depends on level of disability	- face to face interactive communication when one of the parties is speech or hearing impaired
Flexibility/Selectivity	- both parties must be fluent in the same type of sign language - face to face contact is required - best for person to person communication, but person to a small group is possible	- different styles available, choice depends on level of impairment, user preference, and other factors	- users must be literate and physically able to write messages
Compatibility with Present Systems	- strategic placing of staff fluent in sign language is required	- hearing aids do not 'pick up' public address announcements very well	-
Compatibility with Utilities	- requires good lighting to see hand symbols clearly	- telephones must have electromagnetic receivers	-
Ease of Implementation	- very few people in a typical carrier's staff would know sign language unless exposed to it through a formal training program	- personal effort by hearing impaired user	- training of staff to recognize and understand the needs of disabled travellers
Status of Development	- ASL is traditional and established. SE still has some symbols being developed	- commercially available and proven	- main requirement is for an improvement in the attitude and policy toward disabled travellers

EXHIBIT 3.2 (continued)

AIDS FOR DEAF AND/OR HARD OF HEARING TRAVELLERS

CHARACTERISTICS	Mechanical	Electronic
Costs	- usually donated - $40 installation fee	$350 each for disabled persons $375 for others
Needs satisfied	- provides interactive communication over a telephone line when at least one of the parties is speech or hearing impaired - essential in trip planning stages	
Flexibility/Selectivity	- users must be able to use a keyboard, and to read output similar to that produced by a typewriter - both parties in a 'conversation' require a compatible teletext device	- users must be able to use a keyboard, and to read a 'calculator style' alphanumeric display - both parties in a 'conversation' require a compatible teletext device
Compatibility with Present Systems	- requires a dedicated telephone line so that the called party knows beforehand that the call is a teletext call	
Compatibility with Utilities	- works with most telephones; in some cases an additional adapter is required	
Ease of Implementation	- users need only a telephone and the teletext device	
Status of Development	- commercially available and proven	

would require hearing aids and telephone earpieces compatible with hearing aids during this stage.

Access and egress, to and from a terminal requires requesting information and making reservations by telephone. Again, teletext systems offer the best fit to the communications needs of this stage of a trip for deaf travellers.

At a terminal, a hearing impaired traveller would have difficulty communicating interactively with ticket agents. Other areas of difficulty in a terminal building would include public address announcements and using restaurants and the like.

Hearing aids, sign language, electronic signs and paper and pencil would be of aid to hearing impaired travellers in dealing with ticket agents and other personnel at terminal facilities. The Loop System, and the changeable signage systems could provide the equivalent of public address announcements to hearing impaired travellers.

On-board vehicles, communication with travel attendants and awareness of announcements become the major barriers for hearing impaired travellers. As in the case of communication with ticket agents, communication with travel attendants may necessitate the use of hearing aids, sign language, electronic signs and paper and pencil. A signage system would be the best aid to enable hearing impaired travellers to receive 'announcements'.

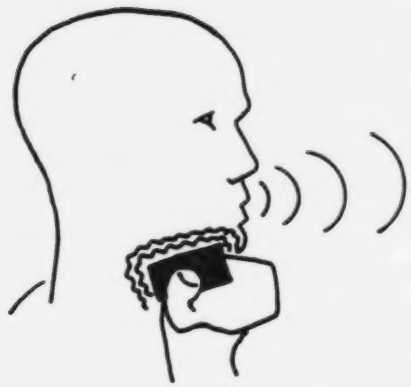
3.3 AIDS FOR SPEECH IMPAIRED TRAVELLERS

3.3.1 Artificial Voices

At any stage of a trip, the need for information, clarification and direction can arise. The speech impaired traveller needs some way of making such requests. The most natural medium is through the use of speech. There are several available technologies capable of producing speech.

3.3.1.1 Artificial Larynx

The Artificial Larynx, as its name implies, is a speech aid which duplicates the function of the larynx. That is, it produces the source sound from which speech is formed. The user must still form the sound into words, using his or her lips and tongue as an unimpaired speaker would. There are several variations available, but their basic function is to inject or produce sound in the oral cavity.



Use of Artificial Larynx

3.3.1.2 Digitized Electronic Speech

This technology makes it possible to generate speech directly from a keyboard input, and to output it to a speaker. The system would involve a series of numbered or named keys which cause the corresponding word to be output from a speaker. By pushing sequences of keys, sentences can be generated. The name 'digitized speech' results from the fact that the available vocabulary was initially spoken, by a professional voice, and then digitized and recoded in electronic digital memories. The speech device can then retrieve selected digitized speech in the order determined by the user.

3.3.1.3 Synthesized Speech

The English or any other language can be broken up into a set of component sounds. If these sounds are digitized and stored in a system similar to 'digitized speech' above, then an unlimited vocabulary of words could be reconstructed from sequences of the component sounds. In order to more accurately and efficiently produce the exact, and often unnatural sounding component sounds (phonemes), the initial source of the speech is often not a human voice, but rather a mathematical or computer model synthesizing the sound (hence the name 'synthesized speech'). For this reason, the resulting speech is more 'mechanical' or 'artificial' sounding than digitized speech. Therefore, the first disadvantage of unlimited vocabulary electronic speech generation devices is that the speech quality, and therefore intelligibility, is reduced. The second disadvantage is the increased complexity and skill required to compose words from their component sounds and enter the desired phoneme sequences into the speech generation device. Many different data entry, or user interface schemes are presently the subject of research. The basic trade-off in user interfaces is between ease of use/skill required to use, and speed of data entry.

Summary - Artificial Voices

The Artificial Larynx is probably the oldest speech aid. It is also the simplest and lowest technology aid. It requires some amount of skill to use well and is small and battery powered. Digitized speech is the simplest to use, requiring only that the user press keys correspondig to the desired words. The vocabulary is limited, but the speech quality is likely the highest with this device. Synthesized speech has the advantage of unlimited vocabulary but requires skill to compose words.

3.3.2 Aids Described Previously which are Also of Aid to the Speech Impaired Traveller

Many of the aids described previously for other disabled travellers would also be beneficial to speech impaired travellers. These aids enable communication, often interactive, to occur without speech input from the user. Specifically, sign language, telephone devices for the deaf, signage, automated telephone information, broadcast systems and the non-technological paper and pencil all are applicable, and of aid, to speech impaired travellers.

3.3.3 Conclusions - Aids for the Speech Impaired

Many of the aids applicable to hearing impaired people, as described in the previous section, are also helpful to speech impaired people. Those aids which are uniquely applicable to speech impaired persons are summarized in Exhibit 3.3.

Relating applicable aids to trip stages, we find that teletext systems are best suited to the planning and access/egress stages of a trip, since communication is usually by telephone. In terminals, signage and automated telphone information systems can provide information to speech impaired travellers while removing the need to 'ask' for it verbally. Artificial voices and paper and pencil allow information requests to be made without using speech. These are best used 'face-to-face' as would be the situaton in a terminal or on-board a vehicle.

3.4 APPROPRIATE TECHNOLOGICAL AIDS

All of the technologies reviewed in this chapter can meet some of the information and communication needs of travellers with sight, hearing or speech disabilities. The technologies that are most appropriate for wide-scale implementation are those which meet the most critical needs in the most cost-effective manner.

In the planning stage of trip making, travellers need timely information on schedules, fares and reservations. All major intercity carriers should be able to provide this information via a TDD such as the Visual Ear. In addition, personnel who serve the regular telephone lines should be aware of the special needs of travellers with partial hearing or speech impairments. Key travel planning information should also be available in Braille, large print and/or audio cassette form for sight impaired travellers.

EXHIBIT 3.3
AIDS FOR SPEECH IMPAIRED TRAVELLERS

CHARACTERISTIC	Artificial Larynx	Electronic Digitized Speech	Synthesized Speech
Costs	$55 and up	$500-$1,000	$500-$2,000
Needs satisfied	- enables speech impaired (due to larynx disfunction) person to speak	- produces speech from a keyboard input	- produces speech from a mechanical input
Flexibility/Selectivity	- user must form the sound from the artificial larynx into words using his or her lips and tongue, as a non-handicapped speaker would	- user must press keys to produce words and compose sentences from an electronic hand-held box - fixed vocabulary of words only	- user operates a keyboard or other mechanical input to produce sounds and compose them into words and sentences from an electronic device
Compatibility with Present Systems	no interaction		
Compatibility with Utilities	- often difficult to use and understand over the telephone		
Ease of Implementation	- should be used face-to-face in a quiet environment	- very simple to use - limited vocabulary can make it awkward to use efficiently	- requires skill to compose sounds into intelligible words - may require manual dexterity to operate some of the more advanced input devices
Status of Development	- popular, training centres well established - new variations still being developed	- commercially available	- many experimental units in use - some units commercially available - improved user interface is subject of development

The needs during the access and egress stages of a trip are similar to the planning needs in that information is required on schedules and fares of intra-city transportation modes which serve inter-city terminals. The needs of many hearing and speech impaired travellers could be met if the intra-city transportation services provided information through a TDD either individually or through a central organization.

The extent to which technological aids are most appropriate to meet the information and communication needs of the disabled within terminals is a function of the size of the terminal and the level of activity which the terminal supports. In smaller terminals with limited numbers of arrivals and departures, personal assistance supplemented with audio announcements and changeable signs appears to be most appropriate. In larger terminals where the size and number of arrivals and departures make it increasingly difficult to convey complete audio and visual information to the general public, technological aids have a place in enhancing the personal assistance which would be available to many disabled travellers.

In particular, aids which would allow travellers with partial sight, hearing or speech impairments to function independently may be very effective in reducing or eliminating obstacles to travel for a large segment of the communication-impaired population. Improved signage, in terms of both design and content, and loop systems in common waiting areas that would allow hearing aid users to better understand public address announcements are two effective improvements which could meet the information needs of partially impaired travellers. It is important that the loop system be designed to transmit messages with a high degree of clarity and that visual signs be provided to indicate that the room is "looped" and that a message is being broadcast. Personal assistance appears to be the most effective and flexible approach for meeting the needs of travellers with profound sight, hearing or speech impairments.

A combination of audio and visual announcements and an awareness of the needs of communication-impaired travellers by carrier personnel can meet the critical needs of these travellers during the on-board element of an inter-city trip. Public address systems, variable or electronic message signs and in certain applications, where electromagnetic interference is not a problem, loop systems on-board the vehicle are the technologies which may be appropriate for implementation.

4.0 INDUSTRY AND GOVERNMENT PRACTICES AND POLICIES

The first section of this chapter presents a listing of the services provided to communication-impaired travellers by different modes for the four elements of a trip - planning, access, terminal and on-board vehicle. The current policies of the carriers and their plans for additional service in the future are also described in this section. All of this information is tabulated by mode in order to provide an overview of the practices and plans of inter-city passenger carriers in Canada.

The second section of the chapter presents a review of the current state of policy at the Federal and Provincial Government levels with respect to communication and information services for communication-impaired travellers. The section also includes a brief discussion on jurisdictional issues and the potential impact of the proposed amendment to the Canadian Human Rights Act and the adoption of the Canadian Charter of Rights and Freedoms. The section concludes with recommendations on specific guidelines which address the provision of information/communication systems for communication-impaired travellers on transportation vehicles and in terminals of all public modes under Federal jurisdiction.

4.1 INDUSTRY PRACTICES

This section presents the current policies, practices and plans of major inter-city air, bus and rail carriers with respect to travellers with sight, speech and hearing disabilities at all stages of the journey. In addition, the plans of the carriers for testing or implementing any improvements in the near future are identified. The above information is tabulated in matrix format in order to provide a good overview of the practices of inter-city carriers in Canada.

4.1.1 Air Carriers

The results of air carriers' interviews are tabulated in Exhibit 4.1.

All the air lines lack a formal policy for handling the needs of communication-impaired travellers. However, most have a formalized training program for ground and cabin personnel. The program usually stresses the understanding of disabled travellers' special needs.

For trip planning purposes, most airlines provide printed schedules and telephone reservations. Air Canada has a TDD for reservations and since air transport reservations are made through a central service, most other airlines are interested in access to the TDD service and are prepared to negotiate cost sharing for the service.

Transportation assistance in access to and from airports is limited to providing lists of the available alternatives and the locations of the most accessible terminal entrance.

EXHIBIT 4.1

INDUSTRY PRACTICES - AIR

MODE: AIR

CARRIER:	AIR CANADA	CP AIR	EASTERN PROVINCIAL	NORDAIR	QUEBECAIR	TRANSPORT CANADA
SERVICE BY TRIP ELEMENT:						
Planning	o telewriters (TDD's) o printed schedules o phone listings o newspaper ads o connection to a travel agency with visual ear o location of information in terminal o drop off location for terminal	o printed schedules o phone listings o newspaper ads o connection to a travel agency with visual ear o location of information in terminal o drop off location for terminal	o printed schedules o phone listings o location of information in terminal	o printed schedules o phone listings o location of information in terminal	o printed schedules o phone listings o location of information in terminal	o publication of the guidebook: "Transportation in Canada: A Guide for Travellers with Special Needs" (TP 380)
Access	o information on intra-city transportation services which access the terminal (generally available on an informal basis)					o color coded parking at Terminal 2 in Toronto o disabled parking spaces o entrance drop off and pick up o signage at terminal access points

EXHIBIT 4.1

INDUSTRY PRACTICES - AIR

MODE: AIR

CARRIER:	AIR CANADA	CP AIR	EASTERN PROVINCIAL	NORDAIR	QUEBECAIR	TRANSPORT CANADA
SERVICE:						
Terminal	o "How may I help you?"program o floating personnel to provide info. o outside baggage check-in at a few terminals (eg. Vancouver)	o "How may I help" program o information and floating personnel to assist	o handle each case individually by hostess	o small airline and handle each case as well as possible	o cards for hearing impaired to ask standard questions o smooth flow of handling terminal interaction	o telephones for disabled travellers o signage o information booths o CRT/arrival and departure information
	Common Services o CRT/arrival & departure boards o pen & paper o escort service from contact to boarding o preboarding o some verbal announcements o redcap at front door o terminal wheelchair					
Onboard	o tactile information of plane facilities	o basic hand signals o tactile information		o Braille safety instructions	o Braille safety instructions o demonstration of plane layout o cards to explain inflight announcements o assistance during meals	
	Common Services o instruction on safety procedures o personal attention o printed safety and instruction cards o accept guide dog o pen and paper o seating preference o emergency exit systems are signed					

EXHIBIT 4.1

INDUSTRY PRACTICES - AIR

MODE: AIR

CARRIER:	AIR CANADA	CP AIR	EASTERN PROVINCIAL	NORDAIR	QUEBECAIR	TRANSPORT CANADA
SERVICE:						
Human Resources	o formal training o field experience o basic training for staff includes method to approach all passengers - what to look for o how to accept passenger and recognize passengers and disability o audio visual presentation to handle mobility and communication impairments o lectures by reps from disabled community o alternative methods of communication for each impairment o treat each passenger according to his needs o floating ground personnel to assist passengers	o formal initial training o field experience o basic training with orientation o periodic upgrading sessions o some personnel have training to move wheelchair travellers o some hand signals o informal training on the job through experience ground o hostesses to escort passengers o each passenger treatead according to his needs	o formal initial training o field training o program to handle disabled needs o scheduled upgrading sessions	o initial formal training o field training o guest speakers on handling disabled o films to provide efficient service o presentation & demonstration of techniques o handle each passenger as individual o terminal guide if notified ahead of arrival	o initial formal training o passenger courtesy and special care techniques o program to handle disabled o visual aids and films o guest speakers o in service training o annual review	o human assistance at information booths in major international airports o publication of the report "A guide to recognizing, understanding and assisting travellers with disabilities" (TP 3461)

EXHIBIT 4.1

INDUSTRY PRACTICES - AIR

MODE: AIR

CARRIER:	AIR CANADA	CP AIR	EASTERN PROVINCIAL	NORDAIR	QUEBECAIR	TRANSPORT CANADA
PLANS FOR IMPROVEMENT:	o in touch with disabled organizations to expand service to more groups of impaired travellers o continuous upgrading of personnel	o TDD to be installed in '83 budget o upgrading program for all staff called "How can I help?" o Braille safety instruction o plane tactile information o streamlining continuity of ground personnel o key terminal personnel to learn basic sign language	o continuous upgrading of all staff o Braille safety procedure cards o share TDD with Air Canada o removable arm rests	o continuous upgrading of all staff o new project to teach sign language to ground personnel	o modify aircraft with 2 removable arm rests and remote control for lights and attendant signal o passes to selected handicapped individuals for research purposes plus a report back on problems in handling	o installing lower telephone booths for disabled o structural changes to terminals o volume control phones are being installed in terminals
RESPONSE TO POSSIBLE DEVELOPMENT OF REGULATIONS AND POLICIES BY FEDERAL GOVERNMENT	o intend to service all needs of disabled passengers o policies & regulations not required and may be detrimental if they eliminate flexibility to handle wide variety of needs	o in some areas, more service is already provided o intend to spend $'s according to demand o improved service for impaired travellers usually improves service for other travellers	o should not regulate for technology that cannot be provided o social services should pay some of the cost o most provisions are for mobility impaired	o regulations would result in standard services from all airlines o impaired traveller would know what to expect o lack of adequate provision for the deaf o lacking capital for new technology	o regulations would result in standard services from all airlines o impaired travellers would know what to expect o Quebecair feels that passengers are satisfied with existing service	

Since the airlines share the terminal facilities, differences in the services provided to communication-impaired travellers are often related to the terminal and not the carrier. In the larger terminals video monitors are used to display arrivals and departures, while in smaller terminals display boards are more commonly used.

Disabled passengers are usually pre-boarded and given individual instructions on safety procedures and layout of terminal and on-board facilities. The smaller airlines are also taking actions to increase access to disabled travellers by such improvements as installing removable arm rests on-board and supplying Braille safety instructions.

A major barrier to communication-impaired travellers is often a lack of understanding by non-impaired persons. The airlines, recognizing this fact, have ongoing formal training procedures to better inform their staff of the special needs of the communication-impaired traveller. The programs include films, demonstrations, lectures by individuals with different types of disabilities as well as practical experience in the field.

All the airlines felt that the disabled community is generally satisfied with actions which are being taken to improve the awareness of the special needs of disabled travellers. The airlines are generally proud of the services and facilities which they are providing to travellers with special needs, but they are aware that there is room for further improvement. The larger airlines perceive the potential intervention of the Federal government into service policies, standards and the use of technology as unnecessary. The smaller airlines feel that standard policies for assistance would help to streamline their operations but they can not afford new technology and do not recognize a major need for technological aids if human resources are available.

4.1.2 VIA Rail

The current policy and services offered by Via Rail are summarized in Exhibit 4.2.

Via Rail has a policy of allowing attendants of CNIB members to ride free of charge. They also allow dog guides to accompany their masters in the coaches. Like the airlines, VIA Rail has a variety of programs for handling the needs of communication-impaired travellers. Their training program now includes procedures to assist travellers with different types of disabilities and provide for their various travel needs.

When planning a trip, deaf or speech impaired travellers with access to a teletype machine can obtain information and reservations. The sight impaired may receive all their information over the phone or have a Braille or 20 point large-type schedule mailed to them.

No assistance is provided to disabled travellers to access the terminal other than a listing of phone numbers for various motor coach, transit, and taxi services.

EXHIBIT 4.2
INDUSTRY PRACTICES - RAIL

MODE: RAIL

CARRIER: VIA RAIL

POLICY	Via Rail has an informal policy regarding the handling of communication-impaired travellers. The distinguishing features which would make Via Rail more accessible are the services. The only existing formal policy allows the attendant of a CNIB member to ride free of charge, and dog guides to accompany their master:
SERVICE BY TRIP ELEMENT	
Planning	- Teletype available for information and reservations;
	- schedule available in standard print, 20pt large type as well as Braille;
	- local phone numbers for reservations on all of Via Rail services.
Access/Egress	- information can be provided on various travel alternatives to get to and from a terminal.
Terminal	- Red caps are available upon arrival and will assist the traveller according to his needs;
	- well signed terminals;
	- employees in the station assist with baggage, tickets and boarding;
	- arrivals and departures displays;
	- audio arrival and departure announcements.
On-Board	- Preferential seating;
	- food service to the seat;
	- assistance with baggage storage and washroom locations.

EXHIBIT 4.2
INDUSTRY PRACTICES - RAIL

MODE: RAIL

CARRIER: VIA RAIL

HUMAN RESOURCES

- formal training procedure for all staff;
- work shops to deal with specific needs of travellers with disabilities;
- similar flow of personnel as airlines when assisting a special needs passenger.

PLANS FOR IMPROVEMENTS

- Each of the main terminals will have a TDD by 1983;
- each group of telephones will have one receiver with a self adjusting amplifier;
- undergoing a retraining program of 2,000 employees to teach basic sign language to communicate with the deaf more effectively;
- more video display units will be installed in terminals;
- special needs pamphlets to be printed in Braille;
- on-going relationship with associations through a consumers pannel which provides comments on changes in procedure.

RESPONSE TO POSSIBLE REGULATION BY FED. GOVERNMENT

- The regulation is not needed since Via Rail has plans to make travel more accessible as part of the service;
- the consumers pannel comments on changes in service and suggests improvements;
- Via intends to keep pace with travellers needs, actively working without regulations.

The major terminals have a red-cap service to meet passengers upon arrival. They are available to handle baggage and escort passengers directly to the ticket agent or information booth depending upon the needs. Verbal announcements as well as arrival and departure displays provide clear instructions for most travellers.

If assistance is needed, pre-boarding is arranged and an escort guides the traveller directly to the seat and provides a description of all coach facilities. All new staff receive formal training to deal with the special needs of communication-impaired travellers. The training program is similar to that of the airlines. VIA Rail is in the process of implementing an ongoing program to aid employees in providing various levels of assistance. All visible staff members will be taught some basic sign language to enable them to more effectively communicate with deaf and hard of hearing travellers who use sign language.

VIA Rail plans to make travel by rail progressively more accessible to service to a wider range of the population. Hence, Via feels that regulations by the Federal government are not needed. A consumers' panel which includes representatives of agencies and organizations of disabled persons regularly reviews and comments on service changes. Overall, the panel is satisfied with the progress VIA Rail is achieving in expanding its level of service to disabled travellers.

4.1.3 Motor Coach Carriers

The motor coach carriers suggested the Canadian Motor Coach Association be contacted and act as a representative of all the motor coach operators in Canada. The Association is in the process of surveying all the motor coach operators in order to develop a nation-wide policy on services to disabled travellers. A summary of the existing services and plans for improvement within the motor coach industry is presented in Exhibit 4.3.

Individual operators do not have a formal policy to handle the needs of communication-impaired travellers. Most operators request the traveller to nofity them at least one day in advance in order to ensure that staff are available to provide them with adequate travel assistance.

Schedule and fare information is available by phone, or in the terminals. Schedules are also made available to various community organizations. Unlike air and rail carriers, reservations for travel cannot be made in advance.

Upon arrival at the station the traveller is assisted either by a ticket agent or an information person. After they receive their ticket the bus driver usually takes over and escorts the traveller to the vehicle. On board the traveller is seated behind the driver to allow for easy communication.

Due to the nature of the operation, most driver training programs place emphasis on the technical aspects of the job. Improvements in the training procedures which would deal with the needs of communication-impaired travellers will be developed based on the outcome of the policy

EXHIBIT 4.3
INDUSTRY PRACTICES - MOTOR COACH

MODE: MOTOR COACH

CARRIER: The Canadian Motor Coach Association represents all motor coach operators in Canada. In conjunction with the operators, the Association is in the process of developing a policy to provide service to travellers with various types of disabilities.

POLICY

- The Association is in the process of developing a policy to apply nationwide. The process included a survey of major terminals to determine existing facilities, policies and services;
- the only policy most operators have is that each passenger should receive assistance in what ever way possible to ensure a successful trip;
- dog guides can accompany their masters without charge and disabled travellers with attendants travel on a two for one fare basis.

SERVICE BY TRIP ELEMENT

Planning
- All operators produce a schedule or series of schedules available at the stations or through other community agencies;
- all operators provide an information service available to passengers in the terminal or over the phone;
- tickets must be purchased at the station and rarely are reservations allowed;
- operators request all passengers with special needs to notify the station one day in advance of travel.

Access
- The information service provides various alternatives for travel to and from the terminal.

Terminal
- Most terminals have direct lines to cab companies or cab stands at the entrance.

On-Board
- Drivers provide assistance in boarding and alighting, and handling of baggage;
- when requested driver will notify passenger when his stop has been reached.

HUMAN RESOURCES
- In most operations the training program places emphasis on the technical aspects of the job;
- Gray Coach has produced a sensitivity film used by staff and which is available to other operators;
- due to the nature of the operation, service is custom tailored to each disabled traveller depending on immediate resources, therefore standard staff training is difficult.

EXHIBIT 4.3

INDUSTRY PRACTICES - MOTOR COACH

MODE: MOTOR COACH

CARRIER: The Canadian Motor Coach Association

PLANS FOR IMPROVEMENTS

- The survey administered by the Association gave an indication of the demand for more accessible services, and summarized the existing facilities and services;
- the possibility of a TDD is being considered for larger terminals;
- tests are going on for a wheelchair that will fit down the aisle of a bus.

REACTION TO POSSIBLE REGULATION BY FED. GOVERNMENT

- initial reaction indicates that the travel demand resulting from more accessible operations would be very small;
- the nature of motor coach service does not lend itself to complex communication systems;
- the diverse range of equipment and facilities would make it almost impossible to implement major changes in service standards for the disabled.

development now underway by the Canadian Motor Coach Association. The reaction of the Association's representative was that the motor coach industry does not feel the need for extensive federal regulations with respect to services for disabled travellers.

4.2 POLICY REVIEW

This section presents a review of the current policy at the Federal Government level with respect to the information/communication needs of communication-impaired travellers, as well as the policies in this area of other jurisdictions that control public inter-city transportation carriers, and the policies of the carriers themselves. A brief discussion of the jurisdictional responsibilities with regard to inter-city transportation and some legislative issues arising from a proposed amendment to the Canadian Human Rights Act and the Canadian Charter of Rights and Freedoms precedes the review of policies. Following this review, a number of recommendations are made as to what specific Federal guidelines may be appropriate to meet the information/communication needs of travellers with sight, hearing and speech disabilities.

4.2.1 Jurisdictional Responsibilities and Legislative Issues

The regulation of air and rail inter-city carriers falls under the jurisdiction of the Federal Government. Some of the specific areas which the government, through Transport Canada, is responsible for include:

- setting out the safety regulations for on-board procedures for air carriers;
- approval of safety features and procedures of the air carriers as a condition for granting operating certificates;
- negotiating franchises with private companies to provide ground transportation to airports;
- providing ground transportation and parking within the boundaries of federal air terminal properties;
- annual approval of VIA Rail capital and operating expenditures.

Through the Canadian Transport Commission (CTC), the Federal Government also has responsibility for approving the tariffs (fare structures and operating procedures) of the air carriers and VIA Rail. The Roadcruiser bus service in Newfoundland must also file its tariff with the CTC since it is under Federal jurisdiction as a result of being introduced as a substitute for rail passenger services on the Island in 1968.

Inter-city bus carriers are regulated by provincial motor transport boards. While these boards have always had jurisdiction over licensing urban bus transit operators, the power to grant licenses to inter-provincial, international and inter-city bus carriers, which technically

lies within Federal jurisdiction, was granted to the Provincial boards by the Motor Vehicle Transport Act of 1954.

The jurisdictional responsibilities outlined above may be affected by a proposed amendment to the Canadian Human Rights Act (CHRA). An amendment to the CHRA, which was passed in 1977, prohibits discrimination on the grounds of physical disability for purposes of employment and encourages that physically disabled persons be granted the same access to goods, services, facilities and accommodation as available to the able-bodied. There is a commitment in the Speech from the Throne, April 1980, to amend the CHRA such that it is a matter of discrimination to deny access to goods, services, facilities and accommodation to the physically disabled. The CHRA applies to those areas where the parliament of Canada has legislative authority. Therefore, in addition to the air carriers and VIA Rail, interprovincial or international bus companies and commuter rail services which are operated by CN or CP or use CN or CP tracks and personnel would be under the coverage of the CHRA for the purposes of discrimination.

Similarly, the Charter of Rights and Freedoms contained in the newly proclaimed Constitution will protect physically and mentally handicapped persons against discrimination. The Charter will not come into effect for three years and provinces can over-rule the equality rights of the Charter by applying the "notwithstanding" clause of the Constitution, although such a provincial over-rule would only apply for five years.

It is felt that the Charter of Rights and Freedoms will result in a new level of expectations and a change in attitudes with respect to the rights of the transportation handicapped. The impact of the Charter on policies dealing with the information/communication needs of communication-impaired travellers will be long-term in nature, while in the short-term the amendment to the CHRA will have a greater impact by reinforcing through statutory requirement the introduction of non-discriminatory practices with respect to communication-impaired travellers.

4.2.2 Federal Policies

The primary sources of current and proposed Federal policies with respect to the information/communication needs of travellers with sight, hearing and speech disabilities are Transport Canada and the CTC. Other agencies who either have existing policies in the area or are in the process of policy review and development include: Public Works Canada, the Department of Communications and the Canadian Radio-Television and Telecommunications Commission (CRTC). The specific policies associated with each of these agencies are presented below.

4.2.2.1 Transport Canada

Transport Canada and the Minister's Advisory Committee on Transportation of the Handicapped (ACTH) has developed a draft Federal Policy on Transportation of Disabled Persons. This policy is in response to Recommendation 83 of the report "Obstacles" prepared by the Special Parliamentary Committee on the Disabled and Handicapped. The recommendation stated:

"that the Federal Government direct the Minister of Transport to develop, in consultation with disabled persons and their organizations, and to publish a national policy on transportation for disabled persons, to provide reasonable access to all transportation modes under Federal jurisdiction. This policy should meet the objectives of standardizing tariffs, procedures, rules, regulations, transportation modes and lead to a greater rationalisation of services, particularly between parallel and regular services."

The policy also relates to two of the nine strategic planning objectives of Transport Canada:

- strategic objective No. 5 - to ensure that Canadians are afforded reasonable accessibility to the National Transportation system;
- strategic objective No. 8 - to ensure that users of the National Transportation system are treated equitably.

Simply stated, the proposed policy is to ensure that reasonable and equitable access is provided to disabled persons on transportation modes under Federal jurisdiction, and to remove the physical and attitudinal barriers to travel which these persons experience. There are a number of basic principles underlying the policy statement and these include: the treatment of disabled persons with dignity, consistency, and consideration; the equity of services provided and terms and conditions of carriage between disabled travellers and the general public; and the principle of that the onus should be on regulatory authorities and carriers to show why a travel limitation should be imposed rather than on disabled travellers to prove they have a right to a certain service.

The provision of reasonable and equitable access to transportation services may require a variety of improvements to transport vehicles and terminals. The identification of required improvements should take into consideration such factors as cost, practicality, amount of use, technical feasibility and remaining equipment life in the case of retrofits. Specific improvements which would result from the application of the policy and which would deal with the information/communication needs of communication-impaired travellers, include:

- communications and travel information should be available to the visually and hearing impaired in a format adapted to their abilities;
- Rules and regulations of travel should be available upon request to disabled persons. Rules applicable to blind travellers should be made available in Braille or in cassette form;
- all carrier personnel whose responsibilities include giving assistance to disabled persons should receive special training.

The proposed policy on transportation of disabled persons is currently being circulated for review and comment. The timing for adoption of this policy is uncertain; however, its implementation would be strengthened by the passage of the amendment to the CHRA described earlier.

4.2.2.2 Canadian Transport Commission

The CTC is responsible for regulation of the terms and conditions of carriage of air passengers and for approving the tariffs filed by the air carriers. The CTC also approves the fare structure and operating procedures filed by VIA Rail and the Roadcruiser service in Newfoundland.

The specific rules of the airline tariff filed with the CTC which deal with sight, hearing and speech impaired travellers are listed in Exhibit 4.4. These rules are applicable to all national and regional air carriers in Canada. The rules primarily cover the limitations to travel for disabled passengers. Only the rule which enables guide-dogs to travel with disabled passengers meets some of the information/communication needs of communication-impaired travellers.

Exhibit 4.5 lists the rules of the VIA Rail tariff which apply to communication-impaired travellers. These rules are also applicable to the Roadcruiser service in Newfoundland and charter bus services operated by VIA Rail in lieu of, or as an extension to, their scheduled rail services. The rules allow a disabled person to travel with his or her attendant for a half fare each.

The Motor Vehicle Transport Committee of the CTC recently undertook an enquiry with respect to inter-city bus service to the disabled in Newfoundland. The enquiry resulted in a number of recommendations which were submitted to the Minister of Transport. These recommendations dealt primarily with the provision of an alternate inter-city bus service for non-ambulatory and semi-ambulatory impaired persons in Newfoundland. However, in addition to these recommendations, the enquiry submitted the following suggestions for examination:

1. "For the deaf: closed captioning equipment with red print in main terminals, a warning light that flashes five to ten minutes before departures and prior to spoken announcements; station stop announcements by a visual indicator inside the bus and telecommunication equipment in terminals.

2. For ambulatory impaired: extra handrails painted bright yellow on both sides of the door for the visually impaired, priority seating, use of portable extra step from the ground to the first step and between the first and second step, extra handrails by the front seats to make sitting down and getting up easier, removable armrests on some outer seats to facilitate transfer from wheelchair, installation of seatbelts in front seats; use of the Washington chair or other similarly designed chair for manual lifting, use of

EXHIBIT 4.4

AIRLINE TARIFF RULES DEALING WITH COMMUNICATION-IMPAIRED TRAVELLERS

Rule 33 (A) DEFINITIONS - Passengers shall be considered disabled when their physical, medical or mental condtion requires individual attention on enplaning, deplaning, during flight, in an emergency evacuation or duriny ground handling which is normally not extended to other passengers.

(B) (2) Disabled passengers will be accepted for transportation as outlined in the following:

Disability	Attendant Required	Maximum No. Per Flight
Blind	No	No limit
Deaf	No	No limit
Blind & Deaf	Yes	No limit

(C) SEATING RESTRICTIONS - Disabled passengers will not be permitted to occupy seats in designated emergency exit rows, over-wing emergency exit rows or where the ventral strain may have to be used as an emergency exit on the upper deck of the B747.

(D) RESERVATIONS/CHECK IN REQUIREMENTS - Reservations must be made at least 24 hours in advance of travel, advising the carrier as to the nature of the disability and assistance required. (Not applicable to Pacific Western) Carriers will make every effort to accommodate passengers who fail to make reservations 24 hours in advance but will not be obligated to do so.

(E) ACCEPTANCE OF MOBILITY AIDS AND GUIDE-DOGS - In addition to the regular free-baggage allowance provided in Rule 220, the carrier will accept the following items which must be stowed in the baggage compartment:

(4) Crutches and canes which must be stowed in accordance with carriers safety procedures.

(F) DOGS TRAINED TO LEAD THE BLIND AND/OR ASSIST THE DEAF - Carrier accepts for transportation, without charge a properly harnessed dog trained to lead the blind, and/or assist the deaf, when it accompanies a passenger with impaired vision/hearing dependent upon such dog. The dog will be permitted to accompany such passenger into the cabin, but will not be permitted to occupy a seat.

EXHIBIT 4.5

VIA RAIL TARIFF RULES DEALING WITH SENSORY IMPAIRED TRAVELLERS

(Also Applicable to Roadcruiser Service)

SECTION 13-B, BLIND PERSON AND GUIDE

1. Conditions

A ticket may be sold for the transportation of a blind person and an adult guide (at the fare authorized in 3) upon surrender by the blind person of:

(I) a CN - CP Rail blind-and-guide certificate (Form 92-B) or

(II) a certificate issued by the American Foundation for the Blind.

The guide must be capable of assisting the blind person to get on and off trains and of attending to his/her personal needs throughout the trip.

2. Application of Fare Basis

The fare basis authorized in 3 applies:

(a) on all VIA trains;

(b) on roadcruisers or mixed trains in Newfoundland;

(c) on specified buses chartered by VIA;

(d) on CN ferry between North Sydney, N.S., and Port-aux-Basques, Newfoundland;

(e) on Ontario Northland Railway trains;

(f) on buses of the following companies:

Greyhound Lines of Canada (GLC)
Saskatchewan Bus Company (SBC)

3. Fare Basis

One fare (any fare which the blind person would pay if travelling alone) will apply for the transportation of both passengers.

SECTION 13-C, BLIND PERSON WITH 'SEEING-EYE" DOG

1. A blind person may take a "seeing-eye" dog aboard any train or bus and may take the dog into any car on a train (including cars in which food is served). The dog need not be muzzled.

2. A blind person will be charged any fare available to the general public. A charge will not be made for the transportation of the dog.

3. A blind person, accompanied by a "seeing-eye" dog, may occupy any type of accommodation except a lower or upper berth. If a blind person requests a lower or upper berth, he/she will be permitted to occupy a roomette for the price of an upper berth.

SECTION 13-D, DISABLED PERSON AND ATTENDANT

1. Conditions

A ticket may be sold for the transportation of a disabled person (physically or mentally disabled) and one adult attendant (at the fare authorized in 3) upon:

I presentation (not surrendered) of an identification card issued by the Canadian Rehabilitation Council for the Disabled (or an affiliated institution) certifying that the physically disabled person cannot travel alone;

II presentation (not surrendered) of an identification card issued by Epilepsy Canada (or an affiliated institution) certifying that the epileptic person cannot travel alone;

III surrender of a doctor's certificate stating that the person is disabled and cannot travel alone.

The attendant must be capable of assisting the disabled person to get on and off trains and of attending to his/her personal needs throughout the trip.

2. Application of Fare Basis

As in Section 13-B.

3. Fare Basis

As in Section 13-B.

EXHIBIT 4.6
PUBLIC WORKS CANADA DESIGN STANDARDS DEALING WITH COMMUNICATION IMPAIRED TRAVELLERS

2.3 STAIRS

Stairs required to provide a path of travel for ambulatory disabled people conform to the following:

2.3.1 Nosings

2.3.1.2 The colour of nosings contrasts with the remainder of the stair to help people with poor vision.

*2.3.2 Handrails

2.3.2.1 Handrails on both sides are provided. They conform in addition to Section 2.2 to the following:

2.3.2.2 Are without a break throughout any one flight and where possible for the full stairway except where other paths of travel intercept such stairways.

2.3.2.3 Extend 300 mm beyond the top and bottom risers.

*2.3.3 Tactile Warning Strips

Non-Skid tactile warning strips are provided:

2.3.3.1 At all stairways directly in the path of travel that a person with impaired vision may take, with the exception of enclosed stair towers,

2.3.3.2 At the top of stair runs and intermediate landings intercepted by other paths of travel,

2.3.3.3 That are detectable by walking upon as different from the surrounding floor surfaces,

2.3.3.4 That extend for the entire width of the stairway starting one tread width from the front edge of the top riser back for a distance of 750 mm.

2.6 ELEVATORS

2.6.5 Lighting

The level of illumination at the controls, platform and car threshold and landing sill is at least 54 lx.

*2.6.6 Elevator Car Controls

2.6.6.3 The buttons are identified by markings immediately to the left. The markings are at least 15 mm high, of a contrasting colour and raised at least 1 mm.

2.6.7 Doors

The sizes and locations of doors conform to Section 2.6.1.

2.6.7.1 Reopening activators at the height of 125 mm and 750 mm above the finished floor are provided so that the door automatically reopens without having to make contact if a person or object passes through the doorway.

2.6.8 Information Transfer Within the Car

2.6.8.1 A car position indicator is provided to show the position of the elevator in the hoistway.

2.6.8.2 When the elevator serves more than 4 floors it has an audible signal of 20 dBA or more that sounds when the elevator is stopping at or passing a landing.

2.6.9 Information Transfer in the Lobby

Floor designation at each hoistway is provided on both jambs 1400-1550 mm above the floor in at least numbers 40 mm high raised at least 1 mm from the background.

2.6.10 Signals for Approaching Cars

A visible and audible signal is provided at each hoistway entrance to indicate which car is answering a call and its direction of travel.

2.6.10.1 Audible signals sound once for the up direction and twice for the down direction.

*2.6.11 Lobby Controls

The call buttons are located 1 100 mm above the finished floor and have visual signals to register each call and when that call is answered.

2.7 Washroom Fixtures

2.7.6 Accessories

Washroom accessories are of a type, and are installed, so as to be usable by persons in wheelchairs: that is, not more than 1 400 mm from the finished floor to any user function. They should not be located so as to create an undetectable hazard to the blind.

2.11 Telephones

Accessible public telephones conform to the following:

2.11.1 Are identified as accessible to and usable by people in wheelchairs and people with hearing impairments.

2.11.2 Are provided with unobstructed access to within 300 mm of the front of the telephone with such access not less than 800 mm wide. Bases, enclosures and fixed seats are not to obstruct access. N.B. Ensure that acoustic enclosures do not constitute a hazard to people with seeing difficulties, i.e. an enclosure which is cantilevered from the wall in such a way that it will not be detected by a cane.

2.11.3 Have a hearing aid coupler coil on the handset and an amplifier.
2.11.4 Have push button controls where such equipment is available.
2.11.5 Have a small shelf for special hearing devices such as the visual ear.

* Leniency in the application of these requirements is possible in retrofit situations.

ramps at inaccessible terminals, and accessible washrooms at key stops.

3. For the blind: tactile indicators on the steps of the bus and in terminals, and the use of Braille on notices in terminals and cafeterias.

4. For all disabled: the advance notice needed from those desiring pre-boarding assistances."[2]

The recommendations and suggestions of the enquiry are presently under review. It is expected that a policy will be established on inter-city bus service for disabled persons in Newfoundland within the near future.

4.2.2.3 Other Agencies

Public Works Canada has developed a design standard entitled "BARRIER-FREE DESIGN: Access to and Use of Buildings by Physically Disabled People." The standard has two levels of application as follows:

- Norm A: Public areas on the main floor of a building (including public washrooms) must be accessible. This norm applies to existing buildings and leases of less than 20,000 square feet;

- Norm B: In addition to public areas, areas normally used by employees must be accessible. This norm applies to all new buildings and existing ones with more than 20,000 square feet in area.

The specific sections of the design standard which deal with the information/communication needs of sensory impaired travellers are listed in Exhibit 4.6.

Presently, this standard applies to all buildings under the jurisdiction of Public Works Canada, approximately one-third of all Federal buildings. It is expected that in the near future the standard will apply to all new Federal buildings, including transportation terminals operated by Transport Canada. The extent to which the standard will apply to existing buildings has still to be resolved.

The Department of Communications (DOC) recognizes the enormous potential of communications technology to help disabled persons and has cooperated with other Federal Departments and agencies, provincial governments and the private sector in order to bring about improvements in communications services to the disabled. Improved communications services for

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2 Fleming, M.S. and Silverstone, D.B.,

"Report of the Inquiry Respecting Intercity Bus Service to the Disabled in Newfoundland", Canadian Transport Commission, September 1981.

the disabled can act as a complement to travel by making trip planning an easier task to accomplish. In addition, communications can act as a substitute for transportation by bring disabled persons into contact with other people whom they might not otherwise be able to physically reach.

DOC co-sponsored research and development work on the Visual Ear, a portable, reasonably-priced device which enables the speech and hearing impaired to send and receive messages over the telephone with the help of a small electronic keyboard. More recently, the Department co-sponsored a feasibility study and the construction of a prototype computer-Braille terminal. The study also involved a field trial of an information retrieval system for the blind, using the terminal to receive information and print it in Braille.

Although the Department does not have a formal policy in place with respect to persons with sight, hearing and speech disabilities, it has brought its concerns and specific policy suggestions to the attention of the CRTC, Bell Canada and other telecommunications carriers, and other Federal and Provincial Departments. One of the policies which the Department has supported is the reduction in long distance telephone rates for hearing impaired customers using a device such as the Visual Ear.

The CRTC does not have a formal policy with respect to the needs of communication-impaired persons. However, in a recent decision the CRTC has approved a 50% discount on long distance telephone rates for disabled customers who use devices such as the Visual Ear. In addition, the CRTC is encouraging telephone companies to develop new and/or improved equipment for disabled persons.

4.2.3 Policies at the Provincial Level

As indicated earlier, inter-city bus carriers are regulated by Provincial Motor Transport Boards. At this time, the Boards do not have any specific policies dealing with communication-impaired persons. The Canadian Conference of Motor Transport Administrators (CCMTA), which includes as members the chairmen of all provincial transport boards, is coordinating the development of a policy for the transportation of disabled persons. This work is being done in cooperation with the Canadian Motor Coach Association.

The policy development has dealt primarily with the transportation of mobility impaired persons. However, a survey that has been conducted to determine existing and planned facilities at bus terminals for disabled travellers dealt with the needs of both the mobility and communication-impaired persons. Some of the equipment and facilities which the survey addressed included:

- visual guidance within the terminal for disabled travellers
- tactile guidance within the terminal for blind travellers

- o employee assistance within the terminal for all disabled travellers
- o public address system
- o visual displays and directions
- o available telephone devices for the deaf (e.g. Visual Ear)
- o telephone with volume control for hard of hearing persons.

A task force of the CCMTA is preparing a report on the results of the survey and developing policy recommendations based on the survey results and other work which has been performed. It is expected that these recommendations will be submitted to Federal and Provincial Transport Ministers in the near future. The recommendations will represent a consensus of opinion between the CCMTA and the bus carriers.

4.2.4 Policies of Inter-City Transportation Carriers

The policies of inter-city transportation carriers with respect to the communication-impaired travellers were identified in the previous section. All carriers have a policy to provide some degree of personal assistance both within the terminals from which they operate and on-board vehicles. All modes have in their tariffs sections which allow dog guides to travel with their masters at no extra fare. VIA Rail and the major bus companies also allow disabled passengers to travel with another person who acts as an attendant for a half fare each.

The policies of the air carriers are generally consistent since most follow the lead of Air Canada with respect to services provided to disabled travellers. There is a desire within the industry for the policies to remain informal and unregulated in order to provide the greatest flexibility in responding to the needs of disabled persons.

The services offered by VIA Rail to the communication-impaired travellers are similar to those offered by the air carriers. VIA Rail has a strong commitment to improving its services for disabled travellers and are planning to install TDD's at terminals, provide selected information in Braille and train employees in basic sign language.

The inter-city bus carriers presently do not provide the same level of service to disabled travellers as the air and rail carriers. However, they are in the process of developing a common policy with respect to disabled travellers. This policy should address the needs of both mobility and communication-impaired travellers.

4.3 RECOMMENDATIONS ON GUIDELINES

The proposed Federal Policy on Transportation of Disabled Persons which has been developed by Transport Canada addresses at a broad level the communication and information needs of travellers with sight, hearing and

speech disabilities. A suggested set of specific guidelines which address the needs of communication-impaired persons during the different stages of travel are presented in this section. These guidelines could be adopted by Transport Canada and/or acted upon by the CTC and provincial transport boards during the review of operating licenses of inter-city passenger carriers.

4.3.1 Trip Planning

The following guidelines are recommended to meet the needs of communication-impaired persons during the planning stage of trip making:

- o information on schedules, fares and services offered to the disabled by carriers should be available to travellers with sight, hearing and speech disabilities in a form adapted to their abilities;
- o travellers with sight, hearing and speech disabilities should be able to make reservations by telephone or teletype devices;
- o carrier personnel who deal with travellers on a person-to-person basis should receive attitudinal and instructional training which would assist them in dealing effectively with the needs of communication-impaired travellers;
- o disabled travellers should be made more aware of the special assistance available to them. In addition, travel agencies should become more aware of the services available to disabled travellers, possibly through travel industry associations.

4.3.2 Access to and from Terminals

The following guidelines are recommended to meet the needs of communication-impaired persons during the access stage of trip making:

- o carrier personnel in terminals should provide assistance to communication-impaired travellers in making appropriate arrangements with transportation services which access the terminal if requested by the traveller;
- o whenever possible, intra-urban transportation services which provide access to inter-city transportation terminals should be made aware of and respond to the needs of communication-impaired travellers during the access and egress portions of their trip.

4.3.3 Terminals

The following guidelines are recommended to meet the needs of communication-impaired persons while in inter-city terminals:

- assistance in orientation should be provided to sight impaired and blind travellers within terminals. This assistance may take the form guidance from of a terminal or operator employee in small terminals, and may be a combination of human assistance and technological aids in a larger terminal;

- arrival and departure information should be available to communication-impaired travellers in a form adapted to their abilities. This could entail the provision of visual displays for hard of hearing and deaf persons and audio announcements, either public or over local broadcast systems, for partially sighted and blind persons;

- information on terminal facilities should be available to communication-impaired travellers in a form adapted to their abilities either through human assistance or technological aids.

4.3.4 On-board Vehicles

The following guidelines are recommended to meet the needs of communication-impaired persons while on board vehicles:

- carrier personnel on board vehicles should be trained in recognizing the needs of communication-impaired travellers and understanding how these needs can best be met;

- information which is commonly provided on-board in audio form should also be available in printed form for hard of hearing and deaf travellers, while information commonly provided in printed form should also be available in a format adapted to the needs of partially sighted and blind travellers.

5.0 PROPOSED IMPROVEMENT PROGRAM

The development of an improvement program which would meet the needs of communication-impaired travellers during the various stages of an inter-city trip should take into account the following considerations:

- the improvement program should respond to the guidelines proposed for addressing the needs of the communication-impaired travellers should include an appropriate mix of human assistance and technological aids;
- specific measures within an improvement program should be flexible enough to assist a spectrum of travellers and/or a number of travel needs;
- there is a need to provide timely and selected information both clearly and distinctly. The provision of too much information is just as bad as the provision of too little;
- there is a lack of data on the existing travel demand by communication-impaired persons; however, it is likely that the volume of existing trips by this group is lower than their potential travel demand. Since the needs of this group may change as their frequency of travel increases, measures which are inappropriate given existing volumes may be worthwhile in the future;
- the improvement program needs to include on-going monitoring of the situation with periodic reviews of both the needs of communication-impaired travellers and further developments of technological aids which could supplement human assistance in meeting these needs.

In light of the first consideration above, the proposed improvement program responds to the suggested guidelines which address the needs of communication-impaired travellers. For each guideline, one or more specific measures are proposed. The measures are described in terms of:

- type of impairment group assisted;
- implementation approach;
- timing;
- cost and cost allocation;
- benefits.

5.1 GENERAL MEASURES

Measure #1:

Training programs should be undertaken for all carrier personnel who would potentially deal with travellers with sight, hearing and/or speech disabilities.

Impairment Groups Assisted: All communication-impaired persons.

Implementation Approach: The major air carriers, VIA Rail and several inter-city bus companies have training programs which instruct their personnel in how to meet the needs of disabled travellers. This measure would entail extending such training programs to all other inter-city carriers. Since it is primarily within the bus mode that such training programs are not wide-spread, a program specifically for the bus industry could be developed by the Canadian Motor Coach Association (CMCA) in association with Transport Canada and with the assistance of appropriate organizations of and for disabled persons.

The development of such a program could use existing programs as a starting point in order to limit any duplication of effort. As an added benefit, a review of existing programs may point out any weaknesses in their content or format. A partial listing of available training programs is contained in the appendix of the Transport Canada publication "A guide to recognizing, understanding and assisting travellers with disabilities" (TP 3461). The first edition of the guide dealt with travellers with ambulatory and coordination disabilities, visual impairments, and hearing and learning limitations. The second edition of the guide will include in addition information on recognizing, undertaking and assisting travellers with speech and psychiatic disabilities.

Existing training programs typically have three major goals as follows:

- to increase the participant's awareness of disabled persons;
- to improve the participant's understanding of disabled travellers' special needs;
- to instruct the participant in how to provide effective assistance to disabled travellers.

The first objective can be met by providing information on the causes and effects of different disabilities including common multiple disabilities, and the prevalence of these disabilities among the Canadian population. The training programs should also point out the difficulties in recognizing persons with communication impairments. To meet the second objective, the program can include role playing, presentations by and discussions with communication-impaired persons, and discussions on the ability and individuality of communication-impaired persons. Finally, training to provide effective assistance can include instructions on how to provide information, give instructions, provide guidance or provide other services to communication-impaired persons. The development of such training programs should include input from disabled persons in order to ensure that the programs address the key issues in an effective and appropriate manner. The involvement of the disabled persons should continue through the implementation of the programs.

Timing: Because of the base of existing programs, a general training program for the bus industry could be developed within one year and administered to the appropriate employees in the industry within two years.

Costs and Cost Allocation: The cost of developing a suitable training program which addresses the needs of all disabled travellers from scratch, including the preparation of an audio-visual presentation and the printing of training brochures would be in the order of $80,000 to $100,000. Depending upon the extent to which existing programs are used, this cost could be reduced significantly. The cost of developing a training program for the bus industry could be borne by the individual carriers through the CMCA. Technical assistance could be provided by Transport Canada.

Benefits: This measure would benefit all disabled travellers including those with communication impairments.

5.2 TRIP PLANNING

Measure #2:

An information guide in Braille, large print and/or cassette form sould be prepared for travellers with sight disabilities.

Impairment Groups Assisted: Persons with sight or other impairments which limit reading would be assisted.

Implementation Approach: Transport Canada could consider publishing elements of their recent publication "A Guide For Travellers With Special Needs" in large print, Braille or audio cassette formats as an information guide for blind and partially sighted travellers. The guide would inform sight impaired persons of special transportation services

available across Canada and the facilities, policies and procedures of different carriers with respect to sight impaired persons. The guide would concentrate on providing a limited amount of general travel information and the sources that could be used by sight impaired persons to obtain more detailed information.

The travel guide could be prepared in large print, Braille and/or cassette form. It would be possible to include more detailed information in the Braille guide book but only a small proportion of blind persons are able to read Braille. The cassette form of the guide may provide less detailed information but would be more accessible. The large print version would not be accessible to the blind population and some of the sight impaired population, but it could be published and distributed more economically.

The preparation of tactile maps of the floor plans of major inter-city transportation terminals in Canada should also be considered. Because of the cost of preparing these maps and the lack of certainty on their effectiveness, one or two should be produced and evaluated by actual users. These maps might be included in a limited edition of the guide book which would be distributed to organizations representing blind and partially sighted persons. The guide book and the tactile maps should be developed with the assistance of sight impaired persons in order to ensure that the content and format of the guides are appropriate.

Timing: Elements of this measure could be implemented over a one to two year time frame.

Costs and Cost Allocation: The costs of preparing such a guide would depend upon the level of detail to be included and could range from $30,000 to $60,000. The cost of preparing tactile maps of terminal floor plans would be approximately $3,000 to $6,000 per map. The reproduction costs of the guide book would be several dollars per unit for both the Braille and audio cassette forms, while reproduction costs for each map would be somewhat less. As suggested above, the guide book could be more widely distributed than the maps. Complete versions of the guide books and maps could be made available to individual travellers on a loan basis from various organizations and libraries which provide services to sight impaired persons. The cost of preparing this guide for sight impaired travellers could be covered by Transport Canada as was the case with the printed guide book referenced earlier.

Benefits: Travellers and potential travellers who are blind or partially sighted or who have difficulty in reading printed material could benefit from the implementation of this measure. As indicated in Chapter 2, the number of Canadians who have significant sight impairments is over 200,000.

Measure #3:

All major intercity carriers should be accessible via both telephone and telephone devices for the deaf (TDD).

Impairment Groups Assisted: Telephones can be used by sight impaired and many hard of hearing individuals while TDD's can be used by deaf and speech impaired persons who have access to such a device.

Implementation Approach: Virtually all carriers now provide information over the telephone. In addition, Air Canada and VIA Rail provide information and reservations via a TDD. This measure would involve extending these services to other major air and bus carriers. A recent survey of the bus industry indicated that TDD's were available or were planned for at 20 of 97 bus terminals in order to answer requests from deaf travellers with respect to fares and schedules. The current utilization of the TDD services provided by Air Canada and VIA Rail is relatively low and ranges from 1 to 2 calls per day for the former to 8 to 10 calls per day for the latter. Therefore, one machine per carrier would be more than sufficient and the service could be provided by carrier personnel who regularly handle telephone requests for information and reservations.

Since communications via TDD can be time consuming, these devices should be accessible via toll free numbers. In order to simplify communications, a standard format could be developed for requests and responses. This format could be sent to TDD users after their first contact with the carrier.

Timing: TDD's could be installed at all major carriers in less than one year.

Costs and Cost Allocation: The costs per TDD are approximately $400. In addition, one telephone line would have to be leased per machine and charges for a toll free number would be incurred. The latter changes would be up to a few thousand dollars for regional carriers but could be over $10,000 per year for national carriers. It may also be useful to attach a hard copy printer to the device in order to monitor communications via the TDD. This printer would have to be compatible with the Baudot code and could be, for example, an old teletype machine. Based on the existing utilization of TDD services it is likely that these services could be provided without any additional manpower requirements. Since the marginal cost of providing this service would be relatively low, it could be borne by the carriers themselves.

Benefits: Travellers and potential travellers who are profoundly deaf or hard of hearing to such a degree that they must use a TDD or who have speech impairments which make it difficult for them to communicate orally may benefit from this measure. They will require sufficient manual dexterity to use the TDD and also access to such a machine.

5.3 ACCESS TO AND FROM TERMINALS

Measure #4:

Carrier and/or terminal personnel should be able to provide information and assistance to the communication-impaired traveller for making appropriate arrangements with transportation services which access the terminal.

Impairment Groups Assisted: All impairment groups.

Implementation Approach: Air carriers, VIA Rail and intercity bus operators generally provide travellers with information and assistance through their ticketing agents. In addition, Transport Canada has information booths in some of Canada's major international airports. This measure would involve ensuring that information on all transportation services which access the terminal, including information on any special services for disabled travellers, is available from these sources. In addition, assistance should be provided by carriers to their communication-impaired passengers for transfers from the carriers own vehicles to locations within the terminal where appropriate intra-city transportation services are available. This assistance may not be needed in all cases but should be provided when required because of the nature of the traveller's impairment.

Timing: This measure is relatively straight forward and could be implemented within one year, possibly in coordination with the training program described earlier.

Costs and Cost Allocation: Because of the relatively low frequency of travel by communication-impaired persons, the provision of information and assistance as outlined above would not involve any increase in manpower requirements. The implementation of this measure and any associated administrative costs to maintain up-to-date information should be the responsibility of the carriers.

Benefits: This measure would benefit both communication-impaired and other disabled travellers.

Measure # 5:

The operators of intra-city transportation services should be encouraged to administer awareness programs to their employees who would

potentially deal with communication-impaired travellers. The training program would be aimed at: increasing the employees' awareness of communication-impaired travellers; improving the employees' understanding of the special needs of these travellers; and instructing employees in how to effectively provide assistance to communication-impaired travellers.

Impairment Groups Assisted: All impairment groups.

Implementation Approach: When intra-city transportation services are provided to a terminal on a contract basis, the terminal operator or carrier responsible for the contract should include as a provision a requirement that the operator of the intra-city service will undertake to improve the level of awareness of the needs of the disabled traveller for those employees who may come into person-to-person contact with these travellers. Carriers and terminal operators could provide the intra-city operator with awareness presentations and materials from their own training programs at cost. In those cases where there are no contractual arrangements with the intra-city operator, an effort should be made to encourage the operator to make use of the awareness material on a volunteer basis.

This measure may be difficult to implement among some of the operators, particularly the taxi industry because of the transient nature of employment within the industry and the large number of different operators in major urban centres. In those cases where contracts are let for the provision of services, it may be possible to have operators indicate what they will do to improve the level of awareness of their employees. However, it may be very difficult to ensure that the operators are administering any awareness programs as promised in the contract. Even with these limitations, this measure would have positive results if there is an improved understanding of the needs of communication-impaired travellers among some of the operators.

Timing: This measure could be implemented on an on-going basis at those times when contracts with intra-city carriers are renewed.

Costs and Cost Allocation: The cost of extending existing awareness programs to the operators of intra-city transportation services would be relatively low. The cost of audio-visual material and associated training brochures would be in the order of several hundred dollars for each operator. Since this cost is low, it is not unreasonable to assume that it could be borne by the operator.

Benefits: This measure would be of benefit to both communication-impaired and other disabled travellers.

5.4 TERMINALS

Measure # 6:

Tickets should be coded to identify travellers with special needs such as those with sight, hearing or speech disabilities.

Impairment Groups Assisted: All groups.

Implementation Approach: In terms of providing information within a terminal, personal assistance provides the greatest flexibility and the most effective approach in meeting the needs of travellers with communication impairments. In order to assist the personnel of the carrier in meeting the needs of these travellers, tickets could be coded to identify these needs either when the reservation is made or when the ticket or boarding pass is issued. For example, VIA Rail is implementing a system which utilizes a blank area on their tickets to indicate the nature of any special services to be provided to the passenger. This approach requires a traveller with sight, hearing, speech or other disabilities to identify any specific needs which he or she might have to the carrier when the reservation is made or the ticket is purchased. Air Canada is modifying their reservations system to include coded information of this type on a passenger's file and print it on his or her boarding pass.

As an alternative to the computerized approaches being used by VIA Rail and Air Canada, tickets or passes could be coded manually by the issuing agent. The codes could be in the form of stickers with appropriate international symbols or alphabetic codes defined by the carrier. The codes should differentiate between travellers with partial versus total disabilities since the type of assistance appropriate for one group sometimes differs from that which is appropriate for the other group. A conserted effort should be made by the carrier to ensure that codes are uniform especially within any one mode of transportation.

Timing: The technique of printing a code which identifies a passenger's special needs directly on his or her ticket will be in place at VIA Rail and Air Canada within one year as part of their computerized reservation systems. A manual approach to this measure could be implemented by other carriers within a few months. Computerized systems would require additional planning and effort for implementation.

Costs and Cost Allocation: The cost of implementing a system to indicate a passenger's special needs directly on his or her ticket would be minimal in the case of a manual system. If it were integrated within a computerized ticketing system, the costs would be dependent upon the nature and extent of programming changes required. These costs could be reduced if the changes were implemented in combination with

any other modifications to the ticketing system. These costs should be borne by the carriers themselves.

Benefits: This measure would benefit travellers with communication impairments, other disabilities and also those with other special needs. In addition, the implementation of a computerized approach to identifying these special needs of travellers would give carriers the opportunity to more easily collect data on the travel demands of these groups and allow the carriers to better match their services with the passengers' needs.

Measure # 7:

Orientation information within terminals should be provided through technical aids.

Impairment Groups Assisted: Sight impaired persons as well as the general travelling public.

Implementation Approach: This measure would consist of a number of elements including improved signage for hard of hearing persons and others, cueing for sight impaired travellers and possibly broadcast systems in a limited number of applications.

Virtually all inter-city terminals have some form of signage which provides visual guidance as to the location of facilities such as ticketing areas, washrooms, boarding areas, etc. A recent survey of 97 bus terminals indicated that only 7 of these terminals did not have such signage. The intent of this measure would be to determine if there were any shortcomings in the existing signage and to remedy these shortcomings. This could be accomplished by having terminal operators review their signage against a checklist of key signs which could be prepared by Transport Canada. The operator could then undertake any necessary improvements to meet minimum signage requirements. Transport Canada has signage standards for the air terminals which it operates while VIA Rail is developing standards for its own stations. These could be used as a basis for signage standards for inter-city bus terminals. The standards should be a function of the size and level of activity of the terminal. This measure is particularly applicable to older and smaller terminals which were not designed to modern standards. One area of signage which should not be overlooked is the identification of terminals at a number of points on the exterior to provide arriving passengers an indication of their location.

The use of cueing to provide orientation information for sight impaired travellers is a relatively recent practice. Cueing includes the use of roughened surfaces on handrails and tactile warning strips on floors to warn sight impaired

persons of upcoming ramps and staircases. Both the Department of Public Works and VIA Rail have included specifications for these measures in their design standards for "barrier-free" buildings and terminals. In addition, the report "Travellers with Special Needs - Facility Design Compendium (Illustrated)" (TP 3608E) prepared for Transport Canada presents a number of design guidelines which specifically address the need for cueing information wherever there are changes in elevation, hazardous areas, or activity centres such as ticket or information counters. Similar design standards should be applicable to all intercity transportation terminals. These standards should apply to any new construction or renovation and should be used for retrofits where warranted by high traffic volumes.

The final element of this measure is the use of broadcast systems to provide additional orientation information to sight impaired travellers. A number of such systems, including radio broadcast and talking signs, were reviewed and evaluated as part of the technology assessment task. Based on this evaluation it appears that talking signs have the greatest potential for effectively meeting some of the orientation needs of blind and partially sighted travellers. Since experience with this system is limited, a demonstration test at one terminal should be undertaken to determine its actual on-site performance and the reaction of users. The most appropriate terminal for the demonstration would be medium size in order to allow full coverage by the talking signs, serve more than one carrier in order to test the system in a sufficiently complex environment, and have a few different arrival and departure gates in order to evaluate the usefulness of the orientation information provided by the system.

One measure which could be implemented earlier on would be to install automatic elevator announcers in public elevators. This measure would have limited application since very few of the transportation terminals in Canada have elevators that are used by the travelling public.

Timing: The review and improvement of signage within terminals could be done over a three year time period and maintained on an on-going basis. Cueing design standards should be applied to all new construction and renovations and should be used for the design of retrofits where warranted by sufficient traffic volumes. VIA Rail already has such a program for station improvements in place.

The demonstration of a talking signs system could be carried out over a two year time period. Wide-scale implementation would depend upon the results of the demonstration.

Costs and Cost Allocation: The preparation of a checklist of required signage and basic specifications for this signage could be based on existing standards and would cost in the order of $30,000. This cost could be allocated to Transport Canada. The implementation of improvements within terminals would be the responsibility of terminal operators. Costs would vary considerably depending upon the extent of existing signage but would generally be in the order of several hundred to several thousand dollars for small and medium sized terminals. It is expected that many larger terminals would already have appropriate signage.

The marginal cost of including cueing for sight impaired travellers in new terminal construction and renovation would be minimal. However, the cost of retrofits could be substantial especially for larger terminals. Retrofit costs would be in the order of several thousand dollars for medium sized terminals and $10,000 or more for larger terminals. In smaller terminals where there are a limited number of elevation changes, cueing for sight impaired travellers may not be required.

The cost of implementing broadcast systems to provide orientation information to sight impaired travellers could be determined as part of a demonstration program. The demonstration program, including design and evaluation components, would cost in the order of $40,000 to $80,000. The cost of automatic elevator floor announcers would be approximately $7,000 per elevator, including installation.

Benefits: Improved signage would be of benefit to all travellers while the orientation aids for sight impaired persons would be of benefit to that group.

Measure #8:

All important information should be available through a combination of audio and visual announcements with the possible application of broadcast systems in medium and large size terminals.

Impairment Groups Assisted: All groups of communication-impaired travellers.

Implementation Approach: Virtually all inter-city transportation terminals except for a handful of small bus terminals presently have public address systems and some visual displays of arrival and departure information. The intent of this measure would be to ensure that all important information on arrivals and departures is available in both audio and visual form. In addition, there is a need to improve the accoustical clarity of public address systems. This measure would be relatively straight forward to implement in smaller terminals where the number of arrivals and departures is limited. In larger terminals, it would be diffi-

cult and confusing to announce all arrivals and departures over a public address system. In fact, in larger air terminals such announcements are not permitted in public areas. In these cases, information should be available via direct line telephones placed at key locations within the terminal.

Guidelines could be established as to what information should be announced and what form the audio and visual announcements should take. For example, in all terminals information on arrivals and departures should be displayed visually. This information should include any changes to the schedule and should indicate when the latest changes were made. Audio announcements of arrivals and departures should be limited to schedule changes in larger terminals, but should be made for all arrivals and departures in small and medium-size terminals. In larger terminals these announcements should be limited to the appropriate boarding areas.

Efforts could also be undertaken to improve the accoustics of public address systems within terminals to ensure their effectiveness. VIA Rail has already commissioned a study to review the clarity of the public address systems in their terminals.

In order to provide hard-of-hearing persons with access to the information broadcast over public address systems, loop systems could be installed in holding or waiting areas. The loop system could be connected directly to the public address amplifier. However, appropriate signage must be posted to indicate that the area is "looped" and a changeable sign is required to inform hard-of-hearing persons that a message is being transmitted through the loop system so that they can switch their hearing aids to the 'T' position. It should be noted that not all hard-of-hearing persons can use hearing aids and that not all hearing aids have 'T' switches. These systems would be most applicable in medium size terminals where there is a single waiting area serving a number of different departures. In larger terminals, separate loop systems would be required for each arrival or departure area. The effectiveness of such systems could be evaluated through a limited demonstration program. This program should enlist the participation of hard-of-hearing persons with various degrees of impairment to test and review the loop system installation.

Timing: Since the facilities for audio and visual announcements are in place in most terminals, this measure has already been implemented to a large extent. Guidelines as to the most appropriate content and format of the announcements could be developed in combination with a review of signage requirements within terminals. This development could be undertaken within a two year time period. A

demonstration program which would design and evaluate the use of a loop system within the waiting area of a terminal could also be implemented within that time frame.

Costs and Cost Allocation: Since the implementation of this measure would generally only require the development of guidelines for announcements, the costs would be relatively low. If this work was undertaken as part of the review of signage requirements, the costs of the combined program could be in the order of $30,000 to $50,000. In the case of the loop system, demonstration costs, including design and evaluation, would be in the order of $20,000 to $40,000. The costs of implementing these systems on a wider scale would likely be several thousand dollars per installation.

The development of guidelines for announcements and signage could be undertaken by Transport Canada. In addition, Transport Canada could fund the demonstration of the loop system while the implementation of these systems on a wider scale would be the responsibility of terminal operators.

Benefits: Comprehensive audio and visual announcements would be of benefit not only to communication-impaired travellers but also to the general travelling public. In the case of the loop system, hard-of-hearing travellers who use hearing aids equipped with 'T' switches would benefit assuming that they were aware that a loop system was in operation.

Measure # 9:

Information and improved access to terminal facilities should be provided to travellers with sight, hearing or speech disabilities through human assistance and technological aids.

Impairment Groups Assisted: All types of communication-impaired travellers.

Implementation Approach: Earlier measures have recommended extending training and awareness programs to all carrier personnel who deal with communication-impaired travellers. Such programs would also be appropriate for other employees within terminals who provide services to the travelling public. As was the case with the operators of intra-city transportation services which access the terminal, the existing programs could be used to raise the awareness of those non-carrier employees within terminals who may interact with communication-impaired persons. These employees could include waiters and waitresses in terminal restaurants, store clerks and security personnel.

As indicated earlier, the objectives of the program would be to increase the participants' awareness of communication-impaired travellers, improve their understanding of the

special needs of these travellers and instruct them on how to effectively provide assistance to meet the special needs. Whereas carrier personnel would be exposed to this material as part of a more comprehensive training program, non-carrier personnel may receive this material through brief sessions periodically held at the terminal. This measure is only applicable to larger terminals where a significant number of non-carrier personnel are employed.

Awareness programs have been prepared by a number of carriers including Air Canada, VIA Rail, and several U.S. air carriers, and by organizations of disabled persons such as The Canadian Coordinating Counicl on Deafness. A partial listing of available programs and presentations is contained in the Transport Canada publication "A guide to recognizing, understanding and assisting travellers with disabilities" (TP3461). Many of these awareness programs are available at cost.

In addition to human assistance, technological aids could be provided such as volume controls and ear pieces compatible with hearing aids on telephones throughout the terminal as well as sufficient shelf space and access to a wall plug for TDDs at a number of public phones in the terminal.

Timing: Appropriate non-carrier personnel could be exposed to basic awareness programs through periodic sessions at the terminal which make use of the carriers' programs for their own personnel. These sessions could be initiated after the development of the carriers' programs in a one to two year time period.

Costs and Cost Allocation: The cost of the audio/visual presentation and materials for a basic awareness program would be in the order of several hundred dollars. It could be the responsibility of the terminal operator to ensure that employees working within the terminal were exposed to such programs. The materials cost would therefore also be allocated to the terminal operator. The costs of providing accessible telephones would be the responsibility of the telephone companies.

Benefits: This measure would benefit both communication-impaired and other disabled travellers.

5.5 ON-BOARD VEHICLES

Measure # 10:

On-board information should be provided in both audio and visual formats.

Impairment Groups Assisted: Sight and hearing impaired persons.

Implementation Approach: Information on safety measures and on-board facilities which is commonly provided in audio form should also be available in printed form for hard of hearing and deaf travellers. Information which is commonly provided in printed form should also be available in a format adapted to the needs of partially sighted and blind travellers. This information could be provided in Braille or large print form or by on-board carrier personnel.

Elements of this measure are already in place. For example, printed information on emergency procedures and on-board facilities is available on aircraft and some air carriers have this information also available in Braille and/or large print form. This information need not be included in every seat pocket but should be available from on-board personnel. A large proportion of the sight impaired population cannot read Braille and therefore need to receive this information in an audio form. Human assistance appears to be the best approach to responding to the information requirements of these travellers. Carrier personnel would be able to tell the passenger specifically where emergency exits and on-board facilities are located whereas Braille or large print summaries of this information could only describe the location in a general sense. A similar approach could be used to ensure that the hearing impaired are aware of any announcements which are made over on-board public address systems.

Timing: The provision of Braille and/or large print information cards could be extended to all air carriers within 12 month time period. Human assistance for the information needs of communication-impaired travellers is generally already available.

Costs and Cost Allocation: The marginal costs of this measure are minimal.

Benefits: Travellers with sight or hearing impairments would benefit from the provision of information in a format adapted to their abilities.

5.6 PRIORITY OF IMPLEMENTATION

Although all of the measures included in the improvement program would assist communication-impaired travellers, the implementation of each specific measure has a different priority. The priority is a function of the importance of the need being met, the ease with which the measure could be undertaken, the probability of success of the measure and the cost of its development and implementation. All of the measures were evaluated on the basis of the criteria listed above in a qualitative manner. The results of this evaluation are presented in Exhibit 5.1.

EXHIBIT 5.1

EVALUATION OF PROGRAM MEASURES

TRIP STAGE	MEASURE	PRIORITY OF NEED	EASE OF IMPLEMENTATION	PROBABILITY OF SUCCESS	COST OF IMPLEMENTATION	RECOMMENDED PRIORITY & TIMING
All Stages	1. Training of carrier personnel to deal with communication-impaired travellers.	high	high	high	moderate	- high priority - implementation in short term
Trip Planning	2. An information guide for blind and partially sighted travellers.	moderate	moderate	moderate	moderate to low	- medium priority - implementation in medium term
	3. Information and reservations available from all major carriers via a TDD.	high	high	moderate to high	moderate to low	- high priority - implementation in short term
Access to and from Terminals	4. Assistance in making arrangements with intra-city transportation services.	moderate	high	moderate to high	low	- high priority - implementation in short term
	5. Awareness programs for intra-city transportation services personnel.	moderate	low	moderate to low	moderate to low	- low priority - implementation in long term

EXHIBIT 5.1

EVALUATION OF PROGRAM MEASURES

TRIP STAGE	MEASURE	PRIORITY OF NEED	EASE OF IMPLEMENTATION	PROBABILITY OF SUCCESS	COST OF IMPLEMENTATION	RECOMMENDED PRIORITY & TIMING
Within Terminals	6. Coding of tickets to identify the special needs of communication-impaired travellers.	moderate	high to moderate	high to moderate	moderate to low	- high priority - implementation in short term
	7. Improved orientation information within terminals.	moderate to high	low	moderate	high	- medium priority - implementation over long term
	8. Audio and visual arrival and departure information.	moderate to high	moderate	moderate to high	moderate to high	- medium priority - implementation in medium term
	9. Awareness programs for non-carrier personnel.	moderate	moderate to low	moderate to low	moderate to low	- medium priority - implementation in medium term
On-board Vehicles	10. On-board information in both audio and visual form.	moderate to high	high	moderate	moderate to low	- medium priority - implementation in medium term

Based on the evaluation, we feel that the following measures have the highest priority and should be implemented in the short term:

- Measure No. 1 - training of carrier personnel deal with communication-impaired travellers. This measure is already in place to a large extent among the air and rail carriers and could be implemented over all carriers without difficulty. The probability of success of this measure is high since it can help remove the communications barrier between carrier personnel and communication-impaired travellers.

- Measure No. 3 - information and reservations for all major carriers should be available via TDD's. This measure is also partially in place and could be extended to all major carriers for relatively low capital costs. Based on the experiences of Air Canada and VIA Rail who have these devices in place, this measure can be implemented without a change in staffing levels.

- Measure No. 4 - assistance in making arrangements with intra-city transportation services. This measure would ensure that all communication-impaired travellers could obtain assistance in making arrangements with intra-city transportation services if such assistance was required. In order to implement the measure, carriers would have to ensure that appropriate personnel maintained up-to-date knowledge of intra-city transportation services including those for disabled persons.

- Measure No. 6 - coding of tickets to identify the special needs of communication-impaired travellers. This measure would help carrier personnel to identify the special needs of communication-impaired travellers as they are being processed through the terminal and while they are on-board the vehicle. Computerized versions of this measure are already being implemented by VIA Rail and Air Canada, while manual versions would be relatively easy to implement by all carriers in a short time and at a low cost.

The measures which have the next level of priority and should be implemented over the medium term include:

- Measure No. 2 - an information guide for blind and partially sighted travellers. Such an information guide would help meet some of the trip planning needs of sight impaired travellers. Although this measure would not have as great an impact as those listed in the previous category, it would be a further step in increasing the independence of communication-impaired travellers. Further input is required from blind and

partially sighted persons to define the appropriate level of detail of such a guide. The guides could be produced on audio casette tapes in order to maximize the accessibility of the information.

- Measure No. 8 - audio and visual arrival and departure announcements. Although virtually all terminals have some form of arrival and departure announcements, this measure would entail the development of appropriate standards for both the audio and visual forms of these announcements. The level of effort required to develop such standards and the potentially high cost of implementing these standards dictate that this measure should be implemented over the medium to long term.

- Measure No. 9 - awareness programs for non-carrier terminal personnel. Programs which increase the level of awareness of the needs of communication-impaired travellers are appropriate for all personnel who deal with the travelling public. The improvements in understanding and human assistance which could be expected from such awareness programs would be of benefit to all travellers. It is suggested that this measure be implemented over the medium term in order that potential implementation problems can be properly identified and addressed.

- Measure No. 10 - on-board information in both audio and visual formats. Information which is provided on-board vehicles should be available in a format adapted to the abilities of communication-impaired travellers. Since much of this information can be provided through human assistance, this measure would follow the implementation of training programs as recommended in measure no. 1.

It was judged that the remaining measures should be implemented over the long term and therefore have a third level of priority. The measures in this category include:

- Measure No. 5 - awareness programs for intra-city transportation service personnel. Although this measure would help remove some of the inter-personal barriers that communication-impaired travellers face, the degree to which Transport Canada can influence the actions of intra-city transportation service operators is limited. Therefore, the implementation of this measure may require the cooperation and active participation of agencies and jurisdictions which license intra-city transportation services.

- Measure No. 7 - improved orientation information within terminals. The implementation of this measure should proceed over the long term because of the need to

develop appropriate standards for signage, cueing and broadcast orientation systems. In addition, the costs of upgrading signage and installing cueing and orientation systems would be minimized if these measures were taken in conjunction with other renovations.

5.7 OVERALL IMPLEMENTATION AND MONITORING

The first step in the overall implementation of the improvement program would be the refinement and approval of the suggested guidelines which address the needs of communication-impaired persons during the different stages of travel. This should follow the approval of the proposed Federal Policy on Transportation of Disabled Persons which has been developed by Transport Canada and which addresses the needs of all disabled travellers at a broad level. The refinement of the recommended guidelines should be undertaken jointly by Transport Canada, representatives of the inter-city carriers, and representatives of organizations for disabled persons. These guidelines should provide a link between the policies on transportation of disabled persons and the specific measures to be included in the improvement program.

The second step in the overall implementation would be the review, modification and approval of the specific measures of the program. As pointed out in the previous sections, many of these measures have already been undertaken by some of the carriers. Implementation of these measures would involve reviewing the experience of that group of carriers and extending the measures to the remaining carriers as appropriate.

For a number of the proposed measures, including signage and announcements, minimum standards should be established through a joint effort of Transport Canada, representatives of the carriers and organizations of disabled persons. These standards could then be used by the industry in order to improve their level of service. These improvements should be implemented as quickly as possible without imposing an undue financial burden on the carriers. Subsidies for some of the measures should be considered if their implementation would result in significant benefits and if implementation would be unacceptably delayed without such subsidies. Whenever possible, the onus for development and implementation of the improvement measures should be left with the carriers or their associations. They are closest to the problem and they should be able to identify the most effective means of meeting the recommended guidelines and providing for the information and communication needs of travellers with sight, hearing and speech disabilities.

The final step in the overall implementation of the improvement program would be the on-going monitoring and periodic review of the recommended measures. The needs of communication-impaired persons may change as their numbers and frequency of travel increase. In addition, the characteristics and costs of technological aids which can meet these needs may also change. It is likely that as these travellers become more familiar with inter-city travel, they will seek greater independence and have less need for direct assistance. On-going monitoring is required in order to identify how these new needs can best be met and what measures should be added, modified or dropped. In addition, further developments in the area

of technological aids should be monitored. Advances in electronics are occuring continually and these advances are often accompanied by reductions in cost. As a result, aids which are not technically or financially viable at present may be so in the future.

Number/
Numéro

COMMUNICATION AIDS FOR TRAVELLERS WITH SIGHT/HEARING/SPEECH DISABILITIES

SUMMARY REPORT

prepared for

TRANSPORTATION DEVELOPMENT CENTRE

by
IBI GROUP

DECEMBER, 1982

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The contents of this report reflect the views of the contractor and not necessarily the official views or policies of the Transportation Development Centre.

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17. Abstract

This report summarizes the findings of a study which reviewed the communication needs of travellers with sight, hearing or speech disabilities during the different stages of inter-city trips made on public carriers. The major elements of the report are as follows:

- estimation of the Canadian population of communication-impaired travellers;
- identification of the needs of these travellers;
- identification and evaluation of technological aids available to meet these needs;
- review of government and industry practices and policies in this area;
- development of guidelines addressing the needs of communication-impaired travellers;
- development of a proposed improvement program based on the above guidelines.

More detailed information on the findings of this study is contained in the Final Report for the project.

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17. Résumé

Ce rapport résume les résultats de l'étude qui a passé en revue les besoins ressentis par les passagers souffrant d'une déficience visuelle ou auditive, ou d'un défaut d'élocution, durant les diverses étapes des déplacements intervilles qu'ils effectuent a bord de véhicules de transport en commun. Les principaux éléments de cette étude ont été les suivants:

- estimation du nombre de voyageurs canadiens souffrant d'une forme quelconque de handicap;
- recherche des besoins ressentis par cette catégorie de voyageurs;
- recherche et évaluation des diverses aides susceptibles de répondre à ces besoins;
- revue des méthodes et des politiques gouvernementales applicables à ce domaine;
- elaboration de lignes directrices applicables;
- elaboration d'un programme d'aide amélioré inspire de ces lignes directrices.

Le rapport final donne des informations plus detaillies sur les resultats de cette etude.

18. Mots-clés	19. Diffusion
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1.0 INTRODUCTION

A number of studies are being undertaken by various public agencies and organizations with the objective of improving the access to the national transportation system for the Canadian population with special needs.[1] Among these projects there is no comprehensive study covering all phases of a journey and on all inter-city[2] public carriers for travellers with sight/hearing/speech impairments. Therefore, the Transportation Development Centre of Transport Canada considered it appropriate to sponsor this present study with the objective of identifying and assessing the communication/information needs of travellers with sight, hearing and speech disabilities on-board public transport vehicles and at terminals, and making appropriate recommendations.

The study is limited in scope in that it deals with the communication needs of sight/hearing/speech impaired travellers during stages of inter-city trips made on public carriers. The study does not address intra-city travel nor travel made by private automobile. The stages of an inter-city trip include trip planning, access to and from the terminal, use of the terminal and travel on-board the vehicle. These four stages of a trip provide a framework for reviewing the needs of communication-impaired travellers and identifying transportation system improvements which can help meet these needs.

The major tasks of the study include:

- estimation of the number of Canadians with sight, hearing and speech disabilities and their potential travel demand;
- identification of the communication and information needs of these persons during the different stages of an inter-city trip;
- identification and evaluation of the technological aids available to meet these needs;
- review of the practices and policies of inter-city carriers and government ministries and agencies with respect to communication-impaired travellers;

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1 A person with special needs is an individual with a disability whose needs are best met in a manner different from most people.

2 The term inter-city refers to travel between cities, while intra-city refers to travel within one city.

- development of appropriate federal government guidelines to address the needs of communication-impaired travellers;

- development of an improvement program based on the above guidelines. The improvement program includes recommendations on both technological aids and human assistance.

This report and the companion report which it summarizes, "Communication Aids for Travellers with Sight, Hearing and Speech Disabilities" (TP 3941), are intended to be source of information for those persons responsible for addressing the needs of travellers with communication disabilities during inter-city trips.

2.0 THE NEEDS OF TRAVELLERS WITH COMMUNICATION DISABILITIES

2.1 Population Estimates and Potential Travel Demand

There is an absence of basic data relating to the number of communication-impaired people in Canada and their demographic and socio-economic characteristics. Furthermore, the crude estimates which are available are not always consistent and do not provide a clear breakdown of the population by degree of impairment. As a result of the lack of basic data, most estimates of the communication-impaired population in Canada are based on prevalence rates developed through surveys carried out in the United States.

For the purpose of this study the communication-impaired population in Canada can be divided into two groups: a target population which includes those with severe impairments and which is the focus of this study; and an additional group who have less severe disabilities but who may potentially benefit from the aids and technologies implemented for the target group.

Exhibit 2.1 presents the estimated populations of both the target group and the additional group. The population of the additional group is approximately two to three times as large as that of the target group depending on the type of impairment and the age category. The target population represents just under 6% of the total population in Canada, while the additional population represents just under 13%.

These population estimates are based on a variety of Canadian and U.S. data sources, including:

- "Report on a Study of the Telecommunications Needs of the Blind and Otherwise Print Handicapped in Terms of Systems, Services and Devices" prepared by Hickling-Partners Inc. and published in March, 1981.
- "Health of Canadians" - a report on the Canada Health Survey published in 1981.
- "Reading with Print Limitations" - American Foundation for the Blind, 1979.
- "U.S. National Census of the Deaf Population", 1971.

Because of the extrapolations and assumptions used in the development of the estimates, it should be emphasized that they are presented in order to provide a feel for the order of magnitude of the prevalence of communication impairments in Canada. The population estimates were used to develop estimates of the potential annual travel demand by communication-impaired persons on the different modes. These estimates are shown in Exhibit 2.2.

The travel estimates were based on the travel characteristics of the general population modified to some extent to account for the different

EXHIBIT 2.1

Estimated Canadian Population (1982) of Communication-Impaired Persons

Target Population

Age Group	Impairment			Total[1]
	Sight	Hearing	Speech	
Children	12,800	87,500	95,500	169,000
Adults under 65 years	96,300	438,500	111,000	594,000
Adults 65 years & over	114,400	554,000	22,500	657,000
Total	223,500	1,080,000	229,000	1,420,000

Additional Population Potentially Benefiting from Aids

Age Group	Impairment			Total
	Sight	Hearing	Speech	
Children	81,200	101,000	340,500	417,000
Adults under 65 years	733,700	696,500	395,500	1,542,500
Adults 65 years & over	234,600	937,500	80,000	1,173,500
Total	1,049,500	1,735,000	816,000	3,133,000

1 Since people with multiple impairements are included in more than one column, the total values are less than the sums across each row.

age distribution and employment situation of communication-impaired persons relative to the general population. As indicated in the exhibit, the estimates represent the potential travel demand by communication-impaired persons and not the actual existing travel demand of this group. There is no data on the existing travel patterns of communication-impaired persons, but it is likely that they are lower than the potential values shown in Exhibit 2.2, since existing communications barriers would reduce the propensity for travel by this group.

2.2 Review of Needs

As with all inter-city travellers, communication-impaired persons have information and communication needs throughout the various stages of a trip. Similarly, for all travellers, information must be provided and communications carried out in a format compatible with the abilities of the traveller. The general population typically has the option of receiving information in visual or audio form and of communicating either orally or in writing. The communication-impaired population has a more restricted set of options for receiving and communicating information. Persons with multiple disabilities have even greater restrictions on the format of their communications. The specific information and other needs of these persons during the different stages of a trip are summarized below.

Trip Planning

- information on schedules, fares and services offered to disabled persons;
- reservations and schedule changes;
- information on special services for disabled travellers available during different segments of a planned trip.

Access To and From Terminals

- information on transportation services which access the terminal;
- suitable intra-city transit services which serve inter-city transportation terminals.

Terminals

- orientation information and/or assistance within the terminal, especially at major entrances;
- information on arrivals, departures and gate numbers;
- communications with personnel during ticketing, boarding and other activities;
- information on location and use of terminal facilities, e.g. food services, washrooms.

EXHIBIT 2.2

POTENTIAL TRAVEL DEMAND BY TARGET GROUP
Based on 1982 Canadian Population Estimates

MODE	IMPAIRMENT			
	SIGHT	HEARING	SPEECH	TOTAL
AIR	42,100	196,700	51,400	266,900
RAIL	9,000	42,800	11,400	58,100
BUS	30,700	147,400	39,700	200,300
TOTAL	81,800	386,900	102,500	525,300

POTENTIAL TRAVEL DEMAND BY ADDITIONAL GROUP
Based on 1982 Canadian Population Estimates

MODE	IMPAIRMENT			
	SIGHT	HEARING	SPEECH	TOTAL
AIR	284,800	311,500	183,000	662,000
RAIL	54,000	67,600	40,800	138,600
BUS	180,200	232,600	141,300	473,600
TOTAL	519,000	611,700	365,100	1,274,200

* The potential travel demand is based on a combination of quantitative and qualitative analysis performed by IBI Group.

On-Board Vehicles

- standard information on safety measures and on-board facilities;
- information on vehicle location;
- communications with attendants for services and information.

An examination of the above needs points out that they are similar to the needs of any traveller. What is important is the way in which the needs are met both in terms of human assistance and technological aids. Personnel dealing with communication-impaired travellers should be aware of the abilities of these people and respond to those abilities. Similarly, aids such as signage, broadcast systems and other devices should be designed with the abilities of communication-impaired travellers in mind.

The needs of communication-impaired travellers are described in greater detail in the Transportation Development Centre report entitled "Travellers with Special Needs - Facility Design Compendium (Illustrated)", TP3608E.

3.0 TECHNOLOGICAL AIDS

3.1 Aids for the Blind or Sight-Impaired Traveller

Technological aids used to meet the information and communication needs of blind and partially sighted travellers can be grouped into the following three categories:

- o broadcast systems;
- o audio information systems;
- o tactile systems.

Broadcast Systems

Typically, broadcast systems transfer audio information directly from the information source to the listener utilizing a transmission other than sound waves. The method, therefore, requires the use of specialized transmitters and receivers. The advantages of using a broadcast system rather than simply using a public address amplifier and speaker include selectivity of audience and isolation from ambient noise.

The simplest broadcast system is commonly referred to as the loop system. In this system, a loop of wire surrounding an area is connected to a device very similar to a standard public address amplifier and broadcasts to receivers capable of sensing magnetic field modulation and converting this to audio signals.

Another broadcast system utilizes radio frequency transmission similar to that used by radio stations. Two systems are now in use, amplitude modulated (AM) and frequency modulated (FM). Electronically, AM is slightly cheaper and simpler, but FM provides improved speech quality.

A third system, referred to as talking signs or talking lights, utilizes a light beam which is modulated with audio information. A unique advantage of this system is that the directionality of the light beam can provide improved orientation information for the blind or sight-impaired traveller.

Audio Information Systems

These information systems present in audio form the visual information typically available to travellers. This category includes audio guidance systems, which provide navigation and orientation configurations for blind and partially sighted travellers. An example of this type of system is an automatic elevator floor announcer. These devices, which make use of digital speech synthesizer products, announce which floor the elevator is stopping at and the direction in which the elevator is going, and warn when the doors are about to close.

Automated telephone information systems also fall within this category. These systems require that each piece or group of information be

associated with a telephone number. The resulting block of telephone numbers would then access a computer which would speak the desired information. The only input required by the user is to dial the appropriate telephone number.

Tactile Information Systems

Tactile information systems provide additional orientation and navigation for blind and sight-impaired travellers. Included under this category are such devices as tactile warning strips placed along walkways when there is change in grade and at platform edges, and small tactile maps which could provide a basic model of transportation terminals. Another device which can be used to provide tactile information is a tactile printer, which can print Braille characters and graphic information in relief.

3.2 Aids for Deaf and Hearing-Impaired Travellers

There are a variety of aids available to meet some of the information and communication needs of deaf and hard of hearing travellers. These aids include:

- signage systems;
- teletext systems;
- hearing aids;
- non-technological aids.

Signage Systems

If properly designed and installed, signs and other visual displays can be very efficient replacements of public address announcements for hearing impaired and deaf travellers. In addition to duplicating audio announcements, the signs can show additional detailed information not easily remembered from audio announcements, such as a series of late arrival times or boarding gate changes.

Signage systems can range in level of complexity. The simplest is a fixed or non-changeable sign. The next level of complexity consists of manually changeable signs. These are more flexible than fixed signs, but the message on the sign must be manually recomposed.

Other systems utilize a sign with a number of fixed messages which may be back-lit or have an adjacent light to highlight the valid message. This system is referred to as "visual paging" and has the advantage of remote control, but the disadvantage of a limited vocabulary. The most flexible system comes under the class of electronic signs. Such signs are usually made up of a dot matrix of lights or indicators which can be formed to construct messages of unlimited vocabulary.

Teletext Systems

A class of communication devices commonly referred to as "Telephone Devices for the Deaf" or "Teledevices for the Deaf" (TDD) are available to allow deaf persons to communicate by telephone. The transmitter of such devices consists of a keyboard on which messages are typed. The message is then transmitted over the telephone line and appears on a printer or a small alphanumeric display on the receiving TDD.

Both mechanical and electronic TDDs are available. The mechanical devices are teletype machines which use the Baudot code and which were used in the past by wire services. Baudot code is no longer used by the communications industry and therefore Baudot teletypes are available for use by deaf persons. Several manufacturers now make a TDD which uses Baudot code but has electronic components throughout and is therefore small and portable.

Hearing Aids

Hearing aids normally pick up sounds from a small built-in microphone and amplify these sounds at the user's ear. Because the microphone does not pick up the sound from a telephone earpiece very well, many hearing aids also have a switch (the T-switch) which enables the hearing aid to receive input from a built-in induction loop. The induction loop can sense the magnetic field produced by the telephone ear piece so long as the ear piece uses electromagnetic as opposed to electrostatic technology. Most telephone companies offer a small portable coupler which will convert the acoustic energy an ear piece produces into magnetic energy which hearing can use as input. Unfortunately, portable couplers are not compatible across Canada, because of differences in the design of earpieces.

Non-Technological Aids

This category includes aids such as sign language and paper and pencil.

The traditional method of person-to-person communication between people with profound speech impairments or deafness is sign language. There are two basic types of sign language, the American Sign Language (ASL) and Signed English (SE). ASL is like shorthand since communication takes place through the use of hand motions and facial expressions which represent ideas and emotions rather than full grammatically correct sentences. SE is a literal translation of English and a hand motion or signal is needed for every word. This ensures that proper English grammar is learned.

Paper and pencil is included as an aid because of widespread availability and high degree of flexibility. It must be remembered that technology, powerful as it is, has its place and that sometimes the simplest way of meeting a communication need is the best. The use of paper and pencil for communications requires that both communicating parties have manual dexterity and literacy and that there is a suitable environment for the writing of messages.

3.3 Aids for Speech-Impaired Travellers

Many of the aids previously described for sight and hearing impaired persons would also be beneficial for speech-impaired travellers. These aids include broadcast systems, automated telephone information, signage, TDDs, sign language and paper and pencil.

Artifical voices are aids specifically appropriate for use by some speech-impaired travellers. This category of aids includes such devices as the artificial larynx, which duplicates the function of the human larynx, i.e. producing the source sound from which speech is formed. Another technology is digitized electronic speech which makes it possible to generate speech directly from a keyboard input through the use of an acoustic speaker. This system involves a series of numbered or named keys which cause the corresponding word to be output from the speaker. The drawback of this device is its limited vocabulary.

English or any other language can be broken up into a set of component sounds. If these sounds are digitized and stored on a system similar to the digitized speech device, then an unlimited vocabulary of words can be reconstructed from sequences of the component sounds. However, synthesized speech devices generally have poor speech quality and require considerable skill in composing words from component sounds.

3.4 Appropriate Technological Aids

All of the technologies listed above can meet some of the information and communication needs of sight, hearing and speech impaired travellers. The technologies that are most appropriate for wide-scale implementation are those which meet the most critical needs in the most cost-effective manner.

In the planning stage of trip making. travellers need timely information on schedules, fares and reservations. All major inter-city carriers should be able to provide this information via a TDD such as the Visual Ear. In addition, personnel who serve the regular telephone lines should be aware of the special needs of travellers with partial hearing or speech impairments. Key travel planning information should also be available in Braille, large print and/or audio cassette form for sight impaired travellers.

The needs during the access and egress stages of a trip are similar to the planning needs in that information is required on schedules and fares of intra-city transportation modes which serve inter-city terminals. The needs of many hearing and speech impaired travellers could be met if the intra-city transportation services provided information through a TDD either individually or through a central organization.

The extent to which technological aids are appropriate to meet the information and communication needs of disabled travellers within terminals is a function of the size of the terminal and the level of activity which the terminal supports. In smaller terminals with limited numbers of

arrivals and departures, personal assistance supplemented with audio announcements and variable signage appears to be most appropriate.

In larger terminals where the size and number of arrivals and departures make it increasingly difficult to convey complete audio and visual information to the general public, technological aids have a place in enhancing the personal assistance which would be available to many disabled travellers. In particular, aids which would allow travellers with partial sight, hearing or speech impairments to function independently may be very effective in reducing or eliminating obstacles to travel for a large segment of the communication-impaired population. Improved signage, in terms of both design and content, and loop systems in common waiting areas that would allow hearing aid users to better understand public address announcements are two effective improvements which could meet the information needs of travellers with partial disabilities. It is important that the loop system be designed to transmit messages with a high degree of clarity and that visual signs be provided to indicate that the room is "looped". Personal assistance appears to be the most effective and flexible approach for meeting the needs of travellers with profound sight, hearing or speech impairments.

A combination of audio and visual announcements and an awareness of the needs of communication-impaired travellers by carrier personnel can meet the critical needs of these travellers during the on-board stage of an inter-city trip. Public address systems, variable or electronic message signs and in certain applications where electromagnetic interference is not a problem, loop systems on-board the vehicle are the technologies which may be appropriate for implementation.

4.0 INDUSTRY AND GOVERNMENT PRACTICES AND POLICIES

This section briefly outlines the current practices and policies of major inter-city air, bus, and rail carriers with respect to sight, hearing and speech impaired travellers. A brief review of the current policy of the federal government with respect to these travellers is also presented. The section concludes with recommendations on specific guidelines which address the needs of communication-impaired travellers.

4.1 Industry Practices

Virtually all airlines have a formalized training program for ground and cabin personnel which is aimed at developing an understanding of the special needs of disabled travellers. VIA Rail has also implemented such a program, as have a number of bus companies. The majority of bus companies have not adopted this practice as of yet.

For trip planning purposes, all major carriers provide printed schedules and fare and schedule information over the telephone. In addition to these standard approaches, both Air Canada and VIA Rail provide information and accept reservations through a TDD.

In general, the type of assistance offered by the carriers for access to and from the terminals is limited to providing lists of the available intra-city transportation alternatives.

The type of services offered within terminals varies considerably and depends upon the size of the terminal and the transportation mode it serves. In smaller termials, the services provided include human assistance, simple signage and limited public address systems. In larger terminals these services are supplemented with video monitors to display arrivals and departures and more comprehensive signage and public address systems.

In order to meet the needs of communication-impaired travellers on-board vehicles, human assistance is generally used. As indicated earlier, airline and railway personnel are exposed to formal training programs which increase their awareness of the needs of disabled travellers. Such formal training programs are used on a limited basis in the bus industry. However, bus drivers provide assistance to communication-impaired travellers on an informal basis.

4.2 Industry Policies

All carriers have a policy to provide some degree of personal assistance both within the terminals from which they operate and on-board vehicles. All modes have in their tariffs sections which allow dog guides to travel with their masters at no extra fare. VIA Rail and the major bus companies also allow a disabled passenger to travel with an attendant for the price of one fare.

The policies of the air carriers with respect to services provided to disabled travellers are generally consistent since most follow the lead of Air Canada. However, there is often a time lag between the implementation of a policy by Air Canada and its adoption by other carriers. There is a desire within the industry for the policies to remain informal and unregulated in order to allow for the greatest flexibility in responding to needs of the disabled travellers. A sub-committee of the Air Transport Association of Canada (ATAC) acts as a forum for the exchange of ideas on services for disabled travellers and facilitates the development of common approaches in this area.

The services offered by VIA Rail to communication-impaired travellers are similar to those offered by the air carriers. VIA Rail has a strong commitment to improving its services for disabled passengers and is planning to install TDD's at terminals, provide selected information in Braille and train employees in basic sign language.

Canadian inter-city bus carriers currently do not provide the same level of service to disabled passengers as the air and rail carriers. However, they are in the process of developing a common policy with respect to the transportation disabled. This policy will address the needs of both mobility and communication-impaired travellers.

4.3 Federal Government Policies

The primary sources of current and proposed Federal policies with respect to the information/communication needs of communication-impaired travellers are Transport Canada and the Canadian Transport Commission (CTC). Other agencies with policies in the area or in the process of policy review and development include: Public Works Canada, the Department of Communications and the Canadian Radio, Television and Telecommunications Commission (CRTC).

Transport Canada and the Minister's Advisory Committee on Transportation of the Handicapped (ACTH) has developed a draft "Federal Policy on Transportation of Disabled Persons." This policy is in response to the recommendations contained in the report "Obstacles" prepared by the Special Parlimentary Committee on the Disabled and Handicapped.

Simply stated, the proposed policy is to ensure that reasonable and equitable access is provided to disabled persons on transportation modes under federal jurisdiction, and to remove the physical and attitudinal barriers to travel which these persons experience. There are a number of basic principles underlying the policy statement and these include:

- the treatment of disabled persons with dignity, consistency, and consideration;

- o the equity of services provided and terms and conditions of carriage between disabled travellers and the general public;

- o the onus should be on regulatory authorities and carriers to show why a travel limitation should be imposed rather than on disabled travellers to prove they have a right to a certain service.

The CTC is responsible for regulation of the terms and conditions of carriage of air and rail passengers and for approving the tariffs filed by the air carriers and VIA Rail. The tariffs include specific rules which deal with sight, hearing and speech impaired travellers. For exmple, there are rules which enable dog guides to travel with their masters on-board vehicles and rules which allow a disabled person and his or her attendant to travel for one fare aboard VIA Rail trains.

Public Works Canada has developed a design standard entitled "Barrier-Free Design: Access to and Use of Buildings by Physically Disabled People." This standard will apply to all new federal buildings, including transportation terminals operated by Transport Canada. The extent to which the standard will apply to existing buildings has still to be resolved.

The Department of Communications (DOC) co-sponsored research and development work on the Visual Ear and more recently the development and construction of a prototype computer-Braille terminal.

The CRTC does not have a formal policy with respect to the needs of communication-impaired persons. However, in a recent decision, the CRTC approved a 50% discount on long distance telephone rates for disabled customers who use devices such as the Visual Ear. In addition, the CRTC is encouraging telephone companies to develop new and/or improved equipment for disabled persons.

4.4 Recommended Guidelines

The proposed "Federal Policy on Transportation of Disabled Persons", developed by Transport Canada addresses at a broad level the communication and information needs of sight, hearing and speech impaired travellers. A suggested set of specific guidelines addressing the needs of communication-impaired persons during the different stages of travel has been developed based on the principles underlying the proposed federal policies. These guidelines, which are presented below, could be adopted by Transport Canada and/or acted upon by the CTC and provincial transport boards during the review of operating licenses of inter-city passenger carriers.

Trip Planning

The following guidelines are recommended to meet the needs of communication-impaired persons during the planning stage of trip making:

- information on schedules, fares and services offered to disabled persons by carriers should be available to sight, hearing and speech impaired travellers in a form adapted to their abilities;

- sight, hearing and speech impaired travellers should be able to make reservations by telephone or teletype devices;

- carrier personnel who deal with travellers on a person-to-person basis should receive attitudinal and instructional training which would assist them in dealing effectively with the needs of communication-impaired travellers;

- disabled travellers should be made more aware of the special assistance available to them. In addition, travel agencies should become more aware of the services available to the disabled travellers, possibly through travel industry associations.

Access to and from Terminals

The following guidelines are recommended to meet the needs of communication-impaired persons during the access stage of trip making:

- if requested by the traveller, carrier personnel in terminals should provide assistance to communication-impaired travellers in making arrangements with transportation services which access the terminal.

- whenever possible, operators of intra-city transportation services which provide access to inter-city transportation terminals should be made aware of and respond to the needs of communication-impaired travellers during the access and egress portions of their trip.

Terminals

The following guidelines are recommended to meet the needs of communication-impaired persons while in inter-city terminals:

- assistance in orientation should be provided to sight impaired and blind travellers within terminals. This assistance may take the form of guidance from a terminal or operator employee in small terminals, and may be a combination of human assistance and technological aids in a larger terminal;

- arrival and departure information should be available to communication-impaired travellers in a form adapted to their abilities. This could entail the provision of visual displays for hard of hearing and deaf travellers

and audio announcements, either public or over local broadcast systems, for blind and partially sighted travellers;

- o information on terminal facilities should be available to communication-impaired travellers in a form adapted to their abilities either through human assistance or technological aids.

On-Board Vehicles

The following guidelines are recommended to meet the needs of communication-impaired persons while on-board vehicles:

- o the training of carrier personnel who work on-board vehicles in recognizing the needs of communication-impaired travellers and understanding how these needs can best be met should be continued by those carriers with existing programs and expanded to all other carriers;

- o information commonly provided on-board in audio form should also be available in printed form for hard of hearing and deaf travellers, while information commonly provided in printed form should also be available in a form adapted to the needs of partially sighted and blind travellers.

EXHIBIT 5.1

PROPOSED IMPROVEMENT PROGRAM

TRIP STAGE	IMPROVEMENT MEASURE	IMPAIRMENT GROUPS ASSISTED	IMPLEMENTATION APPROACH	TIMING	COST
All stages	1. All personnel of inter-city carriers who deal with communication-impaired travellers should receive training to improve their awareness of the needs of these travellers and how the needs can be met.	All communication-impaired travellers.	The major air carriers, VIA Rail and several inter-city bus companies have training programs which instruct their personnel in how to meet the needs of disabled travellers. This measure would entail extending such training programs to all other inter-city carriers.	Developed and administered over a two-year period.	Development costs depend upon the nature of the program and could range up to $80,000. However, existing training programs could be purchased for less than $1000. Allocation Carriers
Trip Planning	2. An information guide in Braille, large print and/or audio cassette form.	Blind, partially sighted and other persons with disabilities which limit reading.	Transport Canada could prepare an information guide for blind and sight impaired persons similar to their recent publication "A Guide for Travellers with Special Needs." (TP3608) the guide would inform blind and partially sighted travellers of the special transportation services offered by carriers across Canada.	Implementation over a one to two year period.	Development: $25,000 to $40,000. Implementation: $5 to $10 per Braille brochure or cassette. Allocation: Transport Canada
	3. All major carriers should be accessible via TDD.	Deaf, profoundly speech impaired and other persons who use TDD's.	Air Canada and VIA Rail provide information and reservations via TDD. This measure would involve extending these services to other major inter-city air and bus passenger carriers. Since communications via TDD can be time-consuming, these devices should be accessible via toll-free numbers.	Implementation in less than one year.	Capital costs per carrier: $500. Operating costs: $3,000 to $30,000 per year depending upon long distance charges. Allocation: Carriers

5.0 PROPOSED IMPROVEMENT PROGRAM

The development of an improvement program which would meet the needs of communication-impaired travellers during the various stages of an inter-city trip should take into account the following considerations:

- the specific measures included in an improvement program should respond to the guidelines proposed for addressing the needs of communication-impaired travellers and should include an appropriate mix of human assistance and technological aids;
- proposed measures should be flexible enough to assist a spectrum of travellers and/or a number of travel needs;
- there is a need to provide timely and selected information both clearly and distinctly. The provision of too much information is just as bad as the provision of too little;
- there is a lack of data on the current travel demand by communication-impaired persons; however, it is likely that the volume of existing trips by this group is lower than their potential travel demand. Since the needs of this group may change as frequency of travel increases, measures now inappropriate given existing volumes may be worthwhile in the future;
- the improvement program needs to include on-going monitoring of the situation with periodic reviews of both the needs of communication-impaired travellers and further developments of technological aids which could supplement human assistance in meeting these needs.

The proposed improvement program consists of ten measures as shown in Exhibit 5.1. The first measure, the training of all carrier personnel who deal with communication-impaired travellers, addresses the needs of these travellers during all stages of an inter-city trip. The remaining nine measures address specific needs which arise during one of the four stages of a trip.

Exhibit 5.1 defines each of the measures, indicates which impairment groups would be assisted by the measure, outlines an implementation approach and discusses the timing and possible cost of the measures.

5.1 Priority of Implementation

Although all of the measures included in the improvement program would assist communication-impaired travellers, the implementation of each specific measure has a different priority. The priority is a function of the importance of the need being met, the ease with which the measure could be undertaken, the probability of success of the measure and the cost of development and implementation. All of the measures were evaluated on the

EXHIBIT 5.1 (continued)

PROPOSED IMPROVEMENT PROGRAM

TRIP STAGE	IMPROVEMENT MEASURE	IMPAIRMENT GROUPS ASSISTED	IMPLEMENTATION APPROACH	TIMING	COST
Access to and from Terminals	4. Assistance in making arrangements with transportation services which access inter-city terminals should be available to communication-impaired travellers.	All communication-impaired travellers.	Air carriers, VIA Rail and bus operators generally provide travellers with information and assistance through their ticketing agents. In addition, Transport Canada has information booths in some of Canada's major international airports. This measure would involve ensuring that information on all transportation services which access the terminal, including information on any special services for disabled travellers, is available from these sources.	Implementation possible within a year.	Minimal in small cities, up to a few thousand dollars in large cities. Allocation: Carriers, Transport Canada and terminal operators
	5. The awareness of the needs of communication-impaired travellers by intra-city transportation operators should be improved.	All communication-impaired travellers.	When intra-city transportation services are provided to a terminal on a contract basis, the terminal operator or carrier responsible for the contract should include as a provision a requirement that the operator of the intra-city service undertake to improve the level of awareness of his employees of the needs of the disabled travellers.	Gradual implementation as contracts are renewed.	Several hundred dollars per operator for training materials and brochures. Allocation: intra-city transportation operators
Terminals	6. Tickets should be coded to identify the special needs of communication-impaired travellers.	All communication-impaired travellers.	In order to assist carrier personnel in meeting the needs of communications impaired travellers, tickets could be coded to identify these needs either when the reservation is made or when the ticket or boarding pass is issued.	Currently being implemented by VIA Rail and Air Canada. Other carriers could implement manual systems within a few months.	Minimal for manual system; on a computerized system, this measure would be done in combination with other changes. Allocation: Carriers

PROPOSED IMPROVEMENT PROGRAM

TRIP STAGE	IMPROVEMENT MEASURE	IMPAIRMENT GROUPS ASSISTED	IMPLEMENTATION APPROACH	TIMING	COST
Terminals	7. Improved orientation information.	Blind and partially sighted impaired travellers, as well as other travellers to some extent.	This measure would consist of a number of elements including improved signage, cueing and, in a limited number of applications, broadcast systems. Signage standards should take into account the abilities of sight impaired travellers; cueing standards should be developed and applied to new construction; and there should be a demonstration of 'Talking Signs' technology to determine its effectiveness in providing orientation information.	Signage improvements and cueing over a five year time period; 'Talking Signs' demonstration in two year time frame.	Development of signage standards: $20,000 - $30,000, improved signage and cueing: $500 to $10,000+ per terminal; 'Talking Signs': $10,000 - $40,000 per terminal. Allocation: Terminal operator and Transport Canada
	8. Audio and visual arrival and departure announcements.	All communication-impaired travellers.	The intent of this measure would be to ensure that all important information on arrivals and departures is available in both audio and visual form. This measure would be relatively straightforward to implement in smaller terminals where the number of arrivals and departures is limited. In larger terminals, it would be difficult and confusing to announce all arrivals and departures over a public address system. In these cases, information should be available via direct line telephones placed at key locations within the terminal.	Development of standards within two years; implementation would be ongoing.	Development of announcement standards: $20,000 - $30,000; implementation costs would be highly variable ranging from a few hundred to $50,000+. Allocation: Transport Canada and terminal operators

PROPOSED IMPROVEMENT PROGRAM

TRIP STAGE	IMPROVEMENT MEASURE	IMPAIRMENT GROUPS ASSISTED	IMPLEMENTATION APPROACH	TIMING	COST
Terminals	9. The level of awareness of non-carrier personnel dealing with the public in terminals should be improved.	All communication-impaired travellers.	Measure No. 1 recommends extending awareness training programs to all carrier personnel who deal with communication-impaired travellers. Such programs would also be appropriate for other employees within terminals who provide services to the travelling public.	Initial implementation over two years, on-going maintenance of program.	Basic training materials would cost several hundred dollars per package. Allocation: terminal operators
On-board vehicles	10. On-board information should be provided in a form adapted to the abilities of communication-disabled travellers.	All communication-impaired travellers.	Information on safety measures and on-board facilities which is commonly provided in audio form should also be available in visual or printed form for hard of hearing and deaf travellers. Information which is commonly provided in printed form should also be available in a format adapted to the needs of partially sighted and blind travellers. This information may be best provided through direct human assistance.	Many elements of this measure are already in place.	Marginal costs of this measure would be minimal (under $25) on a per vehicle basis. Allocation: carrier

basis of the criteria listed above in a qualitative manner. The results of this evaluation are presented in Exhibit 5.2.

Based on these criteria, we feel that the following measures have the highest priority and should be implemented in the short term:

- Measure No. 1 - training of carrier personnel to deal with communication-impaired travellers. This measure is already in place to a large extent among the air and rail carriers and could be implemented over all carriers without difficulty. The probability of success of this measure is high since it can help remove the communications barrier between carrier personnel and communication-impaired travellers.

- Measure No. 3 - information and reservations for all major carriers should be available via TDD's. This measure is also partially in place and could be extended to all major carriers for relatively low capital costs. Based on the experiences of Air Canada and VIA Rail who have these devices in place, this measure can be implemented without a change in staffing levels. The implementation of this measure should include the task of informing deaf travellers that such a service is available.

- Measure No. 4 - assistance in making arrangements with intra-city transportation services. This measure would ensure that all communication-impaired travellers could obtain assistance in making arrangements with intra-city transportation services if such assistance was required. In order to implement the measure, carriers would have to ensure that appropriate personnel maintained up-to-date knowledge of intra-city transportation services including those for the disabled.

- Measure No. 6 - coding of tickets to identify the special needs of communication-impaired travellers. This measure would help carrier personnel to identify the special needs of communication-impaired travellers as they are being processed through the terminal and while they are on-board the vehicle. Computerized versions of this measure are already being implemented by VIA Rail and Air Canada, while manual versions would be relatively easy to implement by all carriers in a short time and at a low cost.

The measures which have the next level of priority and should be implemented over the medium term include:

- Measure No. 2 - an information guide for blind and sight impaired travellers. Such an information guide would help meet some of the trip planning needs of blind and sight impaired travellers. Although this

EXHIBIT 5.2

EVALUATION OF PROGRAM MEASURES

TRIP STAGE	MEASURE	PRIORITY OF NEED	EASE OF IMPLEMENTATION	PROBABILITY OF SUCCESS	COST OF IMPLEMENTATION	RECOMMENDED PRIORITY & TIMING
All Stages	1. Training of carrier personnel to deal with communication-impaired travellers.	high	high	high	moderate	- high priority - implementation in short term
Trip Planning	2. An information guide for blind and partially sighted travellers.	moderate	moderate	moderate	moderate to low	- medium priority - implementation in medium term
	3. Information and reservations available from all major carriers via a TDD.	high	high	moderate to high	moderate to low	- high priority - implementation in short term
Access to and from Terminals	4. Assistance in making arrangements with intra-city transportation services.	moderate	high	moderate to high	low	- high priority - implementation in short term
	5. Awareness programs for intra-city transportation services personnel.	moderate	low	moderate to low	moderate to low	- low priority - implementation in long term

EXHIBIT 5.2

EVALUATION OF PROGRAM MEASURES

TRIP STAGE	MEASURE	PRIORITY OF NEED	EASE OF IMPLEMENTATION	PROBABILITY OF SUCCESS	COST OF IMPLEMENTATION	RECOMMENDED PRIORITY & TIMING
Within Terminals	6. Coding of tickets to identify the special needs of communication-impaired travellers.	moderate	high to moderate	high to moderate	moderate to low	- high priority - implementation in short term
	7. Improved orientation information within terminals.	moderate to high	low	moderate	high	- medium priority - implementation over long term
	8. Audio and visual arrival and departure information.	moderate to high	moderate	moderate to high	moderate to high	- medium priority - implementation in medium term
	9. Awareness programs for non-carrier personnel.	moderate	moderate to low	moderate to low	moderate to low	- medium priority - implementation in medium term
On-board Vehicles	10. On-board information in both audio and visual form.	moderate to high	high	moderate	moderate to low	- medium priority - implementation in medium term

measure would not have as great an impact as those listed in the previous category, it would be a further step in increasing the independence of communication-impaired travellers. Further input is required from blind and partially sighted persons to define the appropriate level of detail of such a guide. The guide could be produced on audio cassette tapes in order to maximize the accessibility of the information.

- Measure No. 8 - audio and visual arrival and departure announcements. Although virtually all terminals have some form of arrival and departure announcements, this measure would entail the development of appropriate standards for both the audio and visual forms of these announcements. The level of effort required to develop such standards and the potentially high cost of implementing these standards dictate that this measure be implemented over the medium to long term.

- Measure No. 9 - awareness programs for non-carrier terminal personnel. Programs which increase the level of awareness of the needs of communication-impaired travellers are appropriate for all personnel who deal with the travelling public. The improvements in understanding and human assistance which could be expected from such awareness programs would be of benefit to all travellers. It is suggested that this measure be implemented over the medium term in order that potential implementation problems be properly identified and addressed.

- Measure No. 10 - on-board information in both audio and visual formats. Information provided on-board vehicles should be available in a format adapted to the abilities of communication-impaired travellers. Since much of this information can be provided through human assistance, this measure would follow the implementation of training programs, as recommended in measure no. 1.

It was judged that the remaining measures be implemented over the long term and therefore have a third level of priority. The measures in this category include:

- Measure No. 5 - awareness programs for intra-city transportation service personnel. Although this measure would help remove some of the inter-personal barriers that communication-impaired travellers face, the degree to which Transport Canada can influence the actions of intra-city transportation service operators is limited. Therefore, the implementation of this measure may require the cooperation and active participation of agencies and jurisdictions which license intra-city transportation services.

- Measure No. 7 - improved orientation information within terminals. The implementation of this measure should proceed over the long term because of the need to develop appropriate standards for signage, cueing and broadcast orientation systems. In addition, the costs of upgrading signage and installing cueing and orientation systems would be minimized if these measures were taken in conjunction with other renovations.

5.2 Program Implementation and Monitoring

The first step in the overall implementation of the improvement program would be the refinement and approval of the suggested guidelines which address the needs of communication-impaired persons during the different stages of travel. This should follow the approval of the proposed federal policy on transportation of disabled persons developed by Transport Canada and which addresses the communication and information needs of sight, hearing and speech impaired travellers at a broad level.

The second step in the overall implementation would be the review, modification and approval of the specific measures of the program.

The final step in the overall implementation of the improvement program would be the on-going monitoring and periodic review of the recommended measures. The needs of communication-impaired travellers may change as their numbers and frequency of travel increase. On-going monitoring is required in order to identify how these new needs can best be met and what measures should be added, modified or dropped. In addition, further developments in the area of technological aids should be monitored. Advances in electronics are occurring continually and these advances are often accompanied by reductions in cost. As a result, aids which are not technically or financially feasible at present may be so in the future.